

حمل الآن

مجاناً وحصرياً

المراجعة رقم (1)

اختبار شهر نوفمبر





Test 1

Total mark

10

1 Choose the correct answer from the given ones :

(6 marks)

(1) The radius length of the base of a right circular cone = 5 cm. and its total surface area = $90\pi \text{ cm}^2$, then its drawer length = cm.

(a) 5

(b) 12

(c) 13

(d) 15

(2) The mass of a body 6 kg. If the body is placed on a rough inclined plane that makes an angle of measure 30° with the horizontal and the coefficient of static friction between the body and the plane is $\frac{\sqrt{3}}{3}$, then the body

(a) is about to move up the plane.

(b) is about to move down the plane.

(c) will move on the plane.

(d) in equilibrium and it is not about to move.

(3) In the opposite figure :

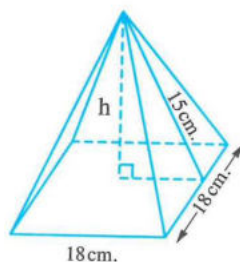
A regular quadrilateral pyramid in which the side length of its base = 18 cm. and the slant height = 15 cm., then its height = cm.

(a) 12

(b) $8\sqrt{3}$

(c) 9

(d) 13



(4) Which of the following statements is not true ?

(a) Any two points in the space have only one plane passing through them.

(b) Any three non-collinear points in the space determine a plane.

(c) The vertices of a triangle determine a plane.

(d) Every two intersecting straight lines are contained in one plane.

(5) If the magnitude of the limiting friction = 60 newton. and the coefficient of friction is 0.75, then the magnitude of the resultant reaction = newton.

(a) 80

(b) 60

(c) 100

(d) 10

(6) A body of weight 20 newton is placed on a rough horizontal plane, if the coefficient of static friction between the body and the plane = $\frac{4}{5}$, then the force which makes the body about to move =

(a) 20

(b) 16

(c) 5

(d) 4

2 Answer the following questions :

(1) A regular quadrilateral pyramid, the side length of its base = 40 cm. , and its slant height is 25 cm. , **find :** (2 marks)

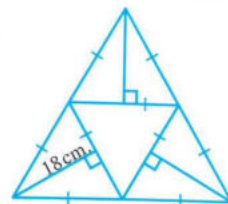
(1) Height of the pyramid.

(2) The total surface area.

(2) A body of weight 65 newton is placed on a rough inclined plane makes an angle with the horizontal whose sine = $\frac{12}{13}$ A force acts on it upward along the line of greatest slope. If the coefficient of static friction = $\frac{2}{5}$ Find the limits of the magnitude of the force that keeps the body in equilibrium on the plane. (2 marks)

1 Choose the correct answer from the given ones :

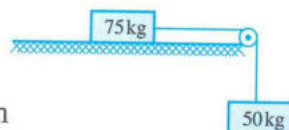
(6 marks)



- (1) By using the folding net , the volume of the solid = cm^3
- (a) $432\sqrt{6}$ (b) $432\sqrt{3}$
- (c) $108\sqrt{3}$ (d) 432
- (2) A regular quadrilateral pyramid its slant height 13 cm. and its height is 12 cm. , then its lateral surface area = cm^2
- (a) 240 (b) 260 (c) 300 (d) 360
- (3) The total surface area of a right circular cone which its drawer length equal the diameter length of its base is
- (a) $4\pi r^2$ (b) $3\pi r^2$ (c) $3\pi r^3$ (d) $4\pi r^3$
- (4) Any three non-collinear points identify
- (a) 1 plane. (b) 2 planes. (c) 3 planes. (d) 4 planes.
- (5) A body of weight 36 newton is placed on a horizontal rough plane , the coefficient of static friction between the body and the plane = $\frac{1}{3}$, a horizontal force acted on it , trying to move it , then the magnitude of friction force $\in$
- (a) $[3, 36]$ (b) $[0, 12]$ (c) $[12, 36]$ (d) $[\frac{1}{3}, 36]$

(6) In the given figure :

A small smooth pulley fixed at the edge of a rough horizontal table , the coefficient of static friction which makes the system about to move =



- (a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) $\frac{2}{5}$

2 Answer the following questions :

- (1) The area of base of a right circular cone is $36\pi \text{ cm}^2$ and the length of its drawer is 10 cm. , find its :
- (1) Lateral surface area.
- (2) Total surface area. (2 marks)
- (2) A body of weight 19 newton is placed on a rough inclined plane. If the body is about to slide down and the magnitude of the limiting friction = $8\sqrt{3}$ newton , then find the measure of angle of inclination between the plane and the horizontal. (2 marks)

كيفية طباعة صفحات معينة من ملف معين مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



حمل الآن

مجاناً وحصرياً

المراجعة رقم (2)

اختبار شهر نوفمبر



Friction – equilibrium of a body placed on a horizontal rough plane



From the school book

Remember

Understand

Apply

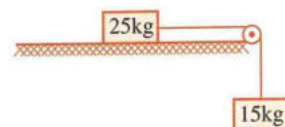
Higher Order Thinking Skills

First Multiple choice questions

Choose the correct answer from the given ones :

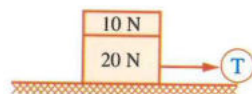
- (1) The angle of friction is the angle between when friction is limiting.
 - (a) the resultant reaction and the limiting static friction
 - (b) the resultant reaction and the normal reaction
 - (c) the resultant reaction and the weight of the body
 - (d) the normal reaction and the static friction
- (2) The coefficient of static friction is
 - (a) a force acts against the force acting on the body.
 - (b) the resultant of the normal reaction and friction.
 - (c) the ratio between the magnitude of the limiting friction to the magnitude of the normal reaction.
 - (d) the ratio between the magnitude of the resultant reaction to the magnitude of the limiting friction.
- (3) The resultant reaction is the resultant of when the body is about to move.
 - (a) the weight of the body and the normal reaction.
 - (b) the weight of the body and the limiting static friction.
 - (c) the normal reaction and the limiting static friction.
 - (d) the kinetic friction and the normal reaction.

- (4) Tangent of the angle between the normal reaction and the resultant reaction at the limiting friction is called
 (a) angle of friction. (b) coefficient of friction.
 (c) the friction force. (d) the limiting friction force.
- (5) The coefficient of friction between two bodies depends on of the bodies in contact.
 (a) the shape (b) the weight (c) the volume (d) the nature
- (6) If μ_s , μ_k are static and kinetic coefficients of friction respectively of two bodies touching each other, then
 (a) $\mu_s = \mu_k$ (b) $\mu_s < \mu_k$ (c) $\mu_s > \mu_k$ (d) $\mu_s + \mu_k = 1$
- (7) If θ is the measure of the angle between the normal reaction and the resultant reaction when the friction is limiting and 2θ is the measure of the angle between the resultant reaction and the limiting static friction, then the coefficient of static friction =
 (a) $\frac{\sqrt{3}}{3}$ (b) $\sqrt{3}$ (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{1}{3}$
- (8) Wael pushes a box of books to his car on a rough horizontal plane. The weight of the box and the books is 80 N, and the coefficient of static friction between the box and the plane is 0.25, then the horizontal force that Wael can use to make the box about to move equals N
 (a) 20 (b) 60 (c) 80 (d) 320
- (9) A body of weight (w) kg.wt. is placed on a rough horizontal plane and the coefficient of static friction between the body and the plane = $\frac{2}{5}$
 If a horizontal force of magnitude 45 kg.wt. acts on the body and make it about to move, then the weight of the body = kg.wt.
 (a) 22.5 (b) 90 (c) 112.5 (d) 225
- (10) In the opposite figure :
 The pulley is smooth, the horizontal plane is rough, the system is about to move, then the coefficient of static friction =
 (a) $\frac{3}{4}$ (b) $\frac{3}{5}$ (c) $\frac{4}{5}$ (d) $\frac{5}{3}$
- (11) A horizontal force of magnitude 50 newton acts on a body placed on a rough horizontal plane if the body becomes about to move and the weight of the body is 75 newton, then the coefficient of kinetic friction may be
 (a) $\frac{3}{5}$ (b) $\frac{5}{6}$ (c) $\frac{3}{4}$ (d) $\frac{5}{7}$



- (12) A body of weight 360 N. is placed on a rough horizontal plane and the coefficient of static friction between the body and the plane = $\frac{1}{6}$, then the magnitude of the friction force = N.
 (a) zero (b) 60 (c) 120 (d) 360
- (13) The dimensions of a cuboid box are 30 cm. , 40 cm. , 50 cm. its required to drag on a rough horizontal ground , the coefficient of friction between the box and the ground is $\frac{1}{4}$, which face should placed on the ground to drag the box with the least force ?
 (a) on the face whose dimensions 30 cm. , 40 cm.
 (b) on the face whose dimensions 40 cm. , 50 cm.
 (c) on the face whose dimensions 30 cm. , 50 cm.
 (d) the force does not depend on the area of contact with the ground.

- (14) A body consists of two parts their weights are 20 N. , 10 N. , are placed as shown in the figure , a horizontal force of magnitude T acts on it and makes the body about to move , if the upper body of weight 10 N.



is removed and the tension is still acting as it was , then the body

- (a) moves in the tension direction. (b) stays about to move.
 (c) stays at rest and not about to move.
 (d) moves in the opposite direction of tension.

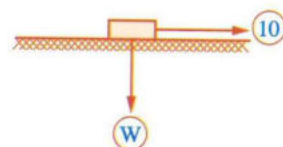
(15) In the opposite figure :

A body of weight (w) kg.wt. is placed on a rough horizontal surface. A horizontal force of magnitude 10 kg.wt. acts on the body and makes the body about to move.

The magnitude of the resultant reaction of the surface is

$10\sqrt{2}$ kg.wt. , then the weight of the body (w) = kg.wt.

- (a) 10 (b) 20 (c) $10\sqrt{2}$ (d) $20\sqrt{2}$



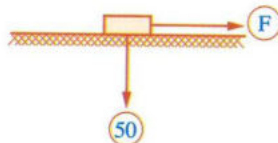
(16) In the opposite figure :

A body of weight 50 kg.wt. is placed on a rough horizontal plane. A horizontal force of magnitude

F kg.wt. acts on it and makes the body about to move.

If the sine of angle of friction equals $\frac{3}{\sqrt{34}}$, then F = kg.wt.

- (a) $25\sqrt{34}$ (b) $50\sqrt{34}$ (c) 30 (d) 50



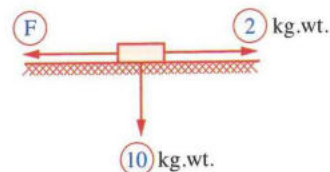
- (17) A body of weight 10 kg.wt. is placed on a rough horizontal plane. The coefficient of static friction between the body and the plane is $\frac{2}{5}$. If a horizontal force of magnitude (F) kg.wt. acts on the body and the body is no longer in equilibrium on the plane , then F could be equal to kg.wt.

- (a) 2 (b) 3 (c) 4 (d) 5

- (18) If λ is the measure of the angle between force of limiting friction and resultant reaction, then μ (the coefficient of static friction) =
 (a) $\tan \lambda$ (b) $\sin \lambda$ (c) $\cos \lambda$ (d) $\cot \lambda$

(19) In the opposite figure :

A body of weight 10 kg.wt. placed on a rough horizontal plane, if the coefficient of static friction between them is $\frac{1}{4}$ and a horizontal force of magnitude 2 kg.wt. acts upon the body, friction force symbolized by F kg.wt., then

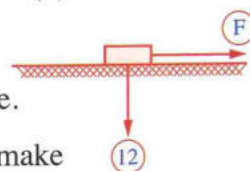


- (a) $F < 2$ (b) $F = 2$ (c) $2 < F < 2.5$ (d) $F = 2.5$
- (20) If the magnitude of the limiting friction force is 60 newton and coefficient of static friction is 0.75, then magnitude of resultant reaction equals
 (a) 60 (b) 80 (c) 100 (d) 200

(21) In the opposite figure :

A body of weight 12 kg.wt. is placed on a rough horizontal plane.

A horizontal force $\vec{F}$ (measured by kg.wt.) acted on the body to make it about to move. If the measure of the angle between the limiting static friction force and the resultant reaction is θ , where $\tan \theta = \frac{3}{4}$, then the magnitude of the resultant reaction $\vec{R} = \dots\dots\dots$ kg.wt.

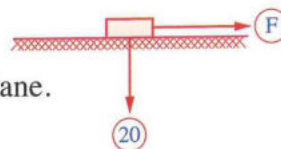


- (a) 9 (b) 20 (c) 15 (d) 12

(22) In the opposite figure :

A body of weight 20 kg.wt. is placed on a rough horizontal plane.

A horizontal force acts on the body to make it about to move when the resultant reaction = 25 kg.wt., then the coefficient of static friction between the body and the plane =

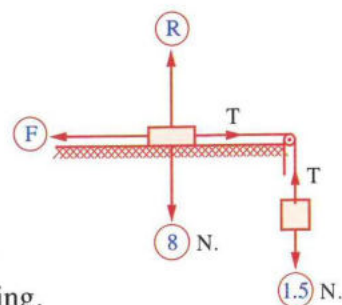


- (a) $\frac{4}{5}$ (b) $\frac{4}{3}$ (c) $\frac{3}{5}$ (d) $\frac{3}{4}$

(23) In the opposite figure :

The coefficient of friction equals $\frac{1}{4}$ and the body is equilibrium on the plane, then

- (a) the magnitude of the friction force = 2 newton.
 (b) the resultant reaction is perpendicular to the plane.
 (c) the friction between the body and the plane is limiting.
 (d) the friction between the body and the plane is not limiting.



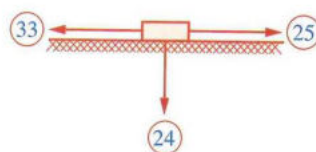
(24) A man cannot push a container contains 13 boxes , the weight of each is 8 kg.wt. on a rough horizontal plane , the coefficient of static friction between the plane and the container equals $\frac{1}{4}$, if the man pushes the container by a horizontal force of magnitude 20 kg.wt. and the weight of the container equals the weight of one box , then the number of boxes must remove from the container to be about to move =

- (a) 9 (b) 8 (c) 4 (d) 3

(25) In the opposite figure :

If the body is about to move under action of the given force as shown in the figure, on a rough horizontal plane then the coefficient of static friction between the body and the plane = (where the forces measured in newton).

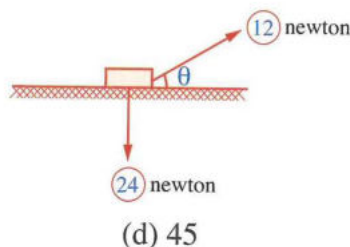
- (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) $\frac{1}{4}$



(26) In the opposite figure :

If the body is about to move and the coefficient of static friction = $\frac{\sqrt{3}}{3}$ then $\theta = \dots\dots\dots^\circ$

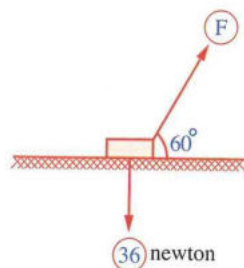
- (a) 30 (b) 60 (c) 75 (d) 45



(27) In the opposite figure :

If the coefficient of friction between the body and the plane = $\sqrt{3}$, the force of magnitude F which makes the body about to move , then F = newton.

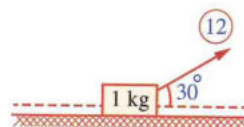
- (a) $18\sqrt{3}$ (b) 18
(c) $16\sqrt{3}$ (d) 36



(28) In the opposite figure :

A brick of mass 1 kg. is in equilibrium on a horizontal rough plane. A force of magnitude 12 newtons inclined to the horizontal at an angle of measure 30° acted on it if the body is about to move , then the coefficient of static friction between the body and the plane =

- (a) $\frac{30\sqrt{3}}{19}$ (b) $\frac{7}{6\sqrt{3}}$ (c) $\frac{1}{12}$ (d) $\frac{5}{6\sqrt{3}}$



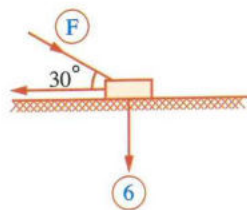
(29) In the opposite figure :

A body of weight 6 N. is placed on a rough horizontal plane.

A force of magnitude 6 N. acts on the body and acts in direction inclined with the horizontal at an angle of measure 30°

The body becomes about to move , then the measure of the angle between the resultant reaction ($\vec{R}$) and the force (F) equals

- (a) 30° (b) 60° (c) 120° (d) 150°



(30) A body has weight $20\sqrt{3}$ newton is placed on a horizontal rough plane. If a force with magnitude $20\sqrt{3}$ newton and makes an angle of measure 30° below the plane makes the body tends to move then the coefficient of static friction between the body and the plane =

- (a) $\frac{1}{3}$ (b) $\frac{\sqrt{3}}{3}$ (c) $\frac{\sqrt{3}}{2}$ (d) $\sqrt{3}$

(31) A body of weight (w) is placed on a rough horizontal plane. The coefficient of static friction between the body and the plane = $\tan \lambda$. If a horizontal force of magnitude (F) N. acts on the body and makes it about to move , then

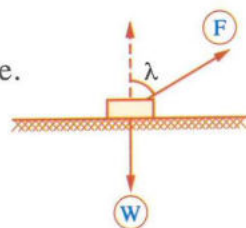
- (a) $F = R \sec \lambda$ (b) $\vec{R} = w \tan \lambda$ (c) $F = \vec{R} \sin \lambda$ (d) $\vec{R} = w \cos \lambda$

(32) In the opposite figure :

A body of weight (w) kg.wt. is placed on a rough horizontal plane.

Force of magnitude F kg.wt. inclined with the vertical at an angle of measure λ and makes the body about to move where λ is the angle of friction. If $F = w$, then $\lambda = \dots\dots\dots^\circ$

- (a) 15 (b) 20 (c) 30 (d) 60



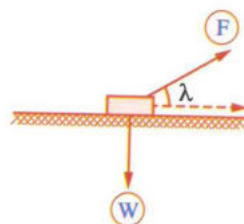
(33) A body of weight (w) gm.wt. is placed on a rough horizontal plane. Two horizontal forces of magnitude 6 , 10 gm.wt. act on the body and makes the body about to move. If the measure of the included angle between the two forces is 60° , then the coefficient of static friction between the body and the plane is $\frac{1}{3}$

, then $w = \dots\dots\dots$ gm.wt.

- (a) 18 (b) 21 (c) 30 (d) 42

(34) In the opposite figure :

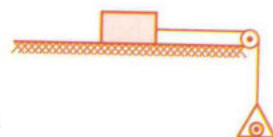
A body of weight (w) newton is placed on a rough horizontal plane. The coefficient of static friction between the body and the plane $= \tan \lambda$. Force of magnitude (F) N. acts on the body and inclined with the horizontal at an angle of measure (λ) and makes the body about to move , then each of the following is true except



- (a) $\vec{F} \perp \vec{R}$ (b) $F = R \tan \lambda$ (c) $F = R \tan \lambda$ (d) $F = w \sin \lambda$

(35) In the opposite figure :

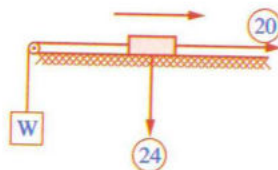
A body of mass 5.6 kg is placed on a horizontal rough plane , the coefficient of the static friction between the body and the plane $= \frac{3}{5}$, the body is tied to the end of a light inelastic string passes over a small smooth pulley fixed at the edge of the plane and the other end of the string is tied to a suspended vertically scale pan its mass is 1.1 kg. , then the weight can be put in the scale pan to make the body about to move = kg.wt.



- (a) 22.148 (b) 4.46 (c) 3.26 (d) 2.26

(36) In the opposite figure :

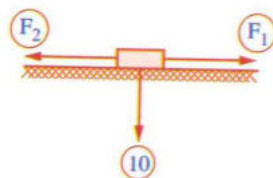
A body of weight 24 newton is placed on a horizontal rough table , the coefficient of the static friction between the body and the table $= \frac{1}{2}$, the body is tied to the end of a light inelastic string passes over a small smooth pulley at the edge of the table and the other end is tied to another body of weight (W) newton suspended vertically. A horizontal force of magnitude 20 newton acts on the body to make it about to move in the direction of the force , then $W = \dots\dots\dots$ newton.



- (a) 24 (b) 8 (c) 6 (d) 12

(37) In the opposite figure :

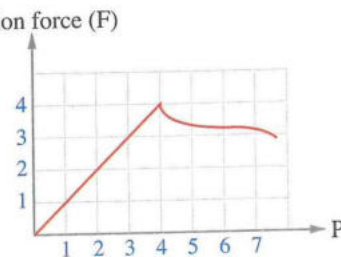
A body of weight 10 kg.wt. is placed on a rough horizontal palne. Two forces $\vec{F}_1$ and $\vec{F}_2$ of magnitude 12 , 17 kg.wt. respectively act on the body. If the coefficient of friction between the body and the plane $\mu_s = \sqrt{3}$, then the magnitude of the resultant reaction = kg.wt.



- (a) $5\sqrt{5}$ (b) $10\sqrt{5}$ (c) 10 (d) 20

(38) The opposite figure represents the relation between Friction force (F)

the friction force (F) and the tangential force parallel to the plane (P) which acting on a body of weight $4\sqrt{3}$ kg.wt. placed on a horizontal rough plane. If the body is about to move, then the magnitude of the resultant reaction = kg.wt.



- (a) 6 (b) $4\sqrt{3}$ (c) 8 (d) $8\sqrt{3}$

Second Essay questions

- 1 A boy pushes a stone of weight 56 newton by a horizontal force of magnitude 42 newton on a ridge, the stone was about to move. Find the coefficient of static friction between the stone and the ridge. « $\frac{3}{4}$ »
- 2 A body of weight 27 kg.wt. is placed on a horizontal rough plane, given that the coefficient of static friction between the body and the plane is $\frac{1}{3}$, find the magnitude of the force parallel to the plane which makes the body about to begin motion. « 9 kg.wt. »
- 3 A body of weight 13.5 kg.wt. is placed on a horizontal rough plane, the coefficient of static friction between the body and the plane is $\frac{2}{3}$, a horizontal force of magnitude 7.5 kg.wt. acted on the body. The body stays in rest. Prove that the body is not about to begin motion and the magnitude of the force of friction equals $\frac{5}{6}$ its value of its limiting value.
- 4 A body of weight 45 kg.wt. is placed on a horizontal rough plane, the coefficient of static friction between the body and the plane is $\frac{1}{3}\sqrt{3}$ Find :
 - (1) The magnitude of the horizontal force that makes the body about to move.
 - (2) The magnitude and the direction of the resultant reaction.« $15\sqrt{3}$, $30\sqrt{3}$ kg.wt., 30° with the normal reaction »
- 5 A body of weight 12 newton is placed on a horizontal table and tied with a horizontal string passing over a smooth pulley fixed at the end of the table edge and the other end of the string is tied by a weight of magnitude 4 newton. If the body is in equilibrium on the table, find the friction force. If it is known that the coefficient of static friction between the body and the table equals $\frac{1}{3}$. Is the body about to move? Explain your answer.

« $F = 4$ N, about to move »

- 6** A wooden block of weight 6 kg.wt. is placed on a horizontal table and is connected by a string passing over a smooth pulley at the edge, to a weight of 1.5 kg. which is hanging freely. Given that the block is in equilibrium, find the magnitude of the force of friction and the magnitude of the normal reaction. If the coefficient of static friction between the block and the table is $\frac{1}{3}$, state whether or not the motion is about to begin.

« 1.5 kg.wt., 6 kg.wt., the motion is not about to begin »

- 7** A body of weight 14 kg.wt. is placed on a horizontal rough plane. When the body is pulled by a horizontal force of magnitude 7 kg.wt., it became about to begin motion. If a weight of 6 kg. is placed on the body, find the magnitude of the horizontal force which makes the body and the weight be about to begin motion.

« 10 kg.wt. »

- 8** A 240 kg. weight is placed on a horizontal rough plane and is pulled by a string which makes an angle of measure 30° with horizontal. If the coefficient of static friction is $\frac{\sqrt{3}}{3}$. Calculate the tension that makes the motion about to begin.

« 120 kg.wt. »

- 9** A body of weight 24 kg.wt. is rested on a horizontal rough plane. A horizontal force of magnitude 8 kg.wt. acted on the body to be about to begin motion, find the force making an angle of measure 45° to the horizontal enough to make the body about to begin motion.

« $6\sqrt{2}$ kg.wt. »

- 10** A block of mass 60 gm. is located on a horizontal rough plane, the angle of static friction between the block and the plane is of measure 30°

Find : (1) The horizontal force enough to make the block about to begin motion.

(2) The force which makes with the horizontal an angle of measure 30° which is enough to make the block about to begin motion.

« $20\sqrt{3}$, 30 gm.wt. »

- 11** A body of weight 16 kg.wt is placed on a horizontal rough plane. The coefficient of static friction between the body and the plane is $\frac{1}{4}$. Find :

(1) The magnitude of a force acting on the body inclined to the horizontal plane upward at an angle whose cosine is $\frac{3}{5}$ to make the body about to move.

(2) The magnitude and the direction of the resultant reaction.

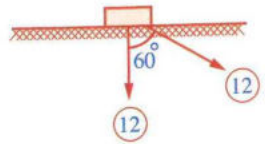
« 5, $3\sqrt{17}$ kg.wt., $14^\circ 2'$ with the vertical »

- 12** A body of weight 40 newton is placed on a horizontal rough plane. A force of magnitude 15 newton making an angle whose $\tan$ is $\frac{3}{4}$ with the plane upwards acted on the body to stay in equilibrium. Find the value of the force of friction, then if the force is increased to become 20 newton in magnitude, then the body became about to begin motion, find the coefficient of static friction.

« 12 newton., $\mu_s = \frac{4}{7}$ »

13 In the opposite figure :

If the body is about to move under action of forces as shown in the figure on a horizontal rough plane, find the coefficient of static friction between the body and the plane (Where the forces are measured in newton).



« $\frac{\sqrt{3}}{3}$ »

- 14** A body of weight $4\sqrt{3}$ newton is located on a horizontal rough plane. A force of magnitude $4\sqrt{3}$ newton acted on the body in the direction 30° with the plane downward to make the body in the case of limiting equilibrium.

Find : (1) The coefficient of static friction between the body and the plane , also find the measure of the angle of friction.

(2) The magnitude of the resultant reaction.

« $\frac{1}{\sqrt{3}}$, 30° , 12 newton. »

- 15** A body of weight 10 newton is placed on a horizontal rough plane. If a force of magnitude 8 newton in the direction making an angle of measure 30° to the horizontal acted on the body , then the body becomes about to begin motion on the plane , find the coefficient of static friction between the body and the plane and when a force of magnitude F newton acted on the body in the opposite direction of the previous force , then it becomes about to begin motion also. Find the magnitude of the force F

« $\frac{2\sqrt{3}}{3}$, 40 newton. »

- 16** The mass of a body is 60 kg. It is placed on a horizontal rough plane. A force of magnitude 30 kg.wt. acted on the mass in the direction making an angle θ upwards the horizontal , then the body becomes about to move , then a force of magnitude 60 kg.wt. acted on the body in the opposite direction of the previous force , then the body became about to move also. Find the coefficient of static friction and the value of θ

« $\frac{1}{3}\sqrt{3}$, 30° »

- 17** A body has weight 15 kg.wt. is placed on a horizontal rough plane. A horizontal force with magnitude (F) acts on it and makes it about to move. If the angle between the resultant reaction and limiting friction has measure (θ) where $\cos \theta = \frac{3}{7}$
Find the magnitude of the resultant reaction.

« $\frac{21\sqrt{10}}{4}$ kg.wt. »

- 18** A body of mass 26 gm. is placed on a horizontal rough plane, the body becomes about to begin motion under the effect of two horizontal forces of magnitudes 7 and 8 gm.wt. including an angle of measure 60° , find the measure of the angle of friction between the body and the plane.

« $26^\circ 34'$ »

- 19** A body of weight 12 kg.wt. is placed on a horizontal rough plane, forces of magnitudes 4 and 4 kg.wt. act horizontally on the body, the angle between them is 60° in measure, if the body is about to begin motion, find the coefficient of static friction between the body and the plane also find the measure of the angle of friction.

« $\frac{1}{\sqrt{3}}$, 30° »

- 20** A body of weight 40 kg.wt. is placed on a horizontal rough plane, two perpendicular forces of magnitudes 6 and 8 kg.wt. acted horizontally on the body, the body stayed in equilibrium, prove that the coefficient of static friction should not be less than $\frac{1}{4}$

- 21** A body of mass 75 gm. rests on a rough horizontal plane, the coefficient of static friction between the body and the plane = $\frac{1}{3}$, if two equal horizontal forces in magnitudes act on the body where the measure of the angle between them = 120° , then the body became about to begin motion, find the magnitude of each of the two forces.

« 25 gm.wt. »

- 22** A body of weight 5 gm.wt. is placed on a horizontal rough plane, 10 and F gm.wt. are the magnitudes of two horizontal forces with an angle of measure 150° between them, act on the body. Find the value of the force F to make the body about to begin motion and determine the direction of motion if the measure of the angle of friction between the body and the plane = 45°

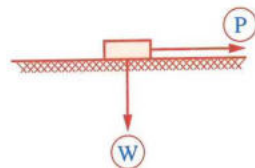
« $5\sqrt{3}$, $\theta = 60^\circ$ with the first force »

- 23**  A body of weight W newton is placed on a horizontal rough plane where the measure of the angle of friction is λ , the body is pulled by a force making an angle of measure 2λ with the horizontal upwards, it makes the body about to begin motion. Prove that the magnitude of this force is $W \tan \lambda$

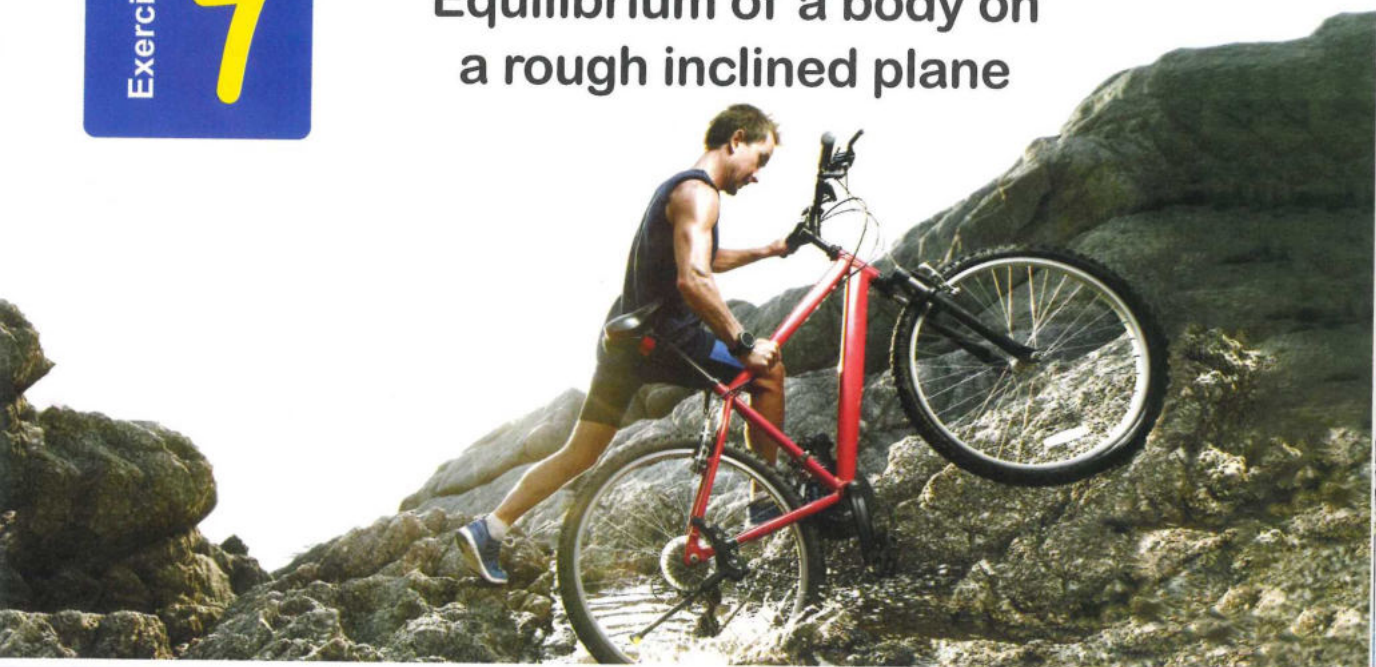
- 24** A body of weight W is placed on a horizontal rough plane, the measure of the angle of friction between them is λ , the body is pulled with a string making an angle of measure θ upwards the horizontal. Prove that the force required to make the body about to begin motion equals $\frac{W \sin \lambda}{\cos(\lambda - \theta)}$, then deduce the least magnitude and the direction of the force sufficient to make the body about to begin motion on the plane.

Choose the correct answer from the given ones :

- (1) A body of weight 3 newton is placed on a horizontal rough plane whose friction coefficient with the body is $\frac{1}{3}$, A horizontal force acted on it, trying to move it, then the friction force $\in$
- (a) $[\frac{1}{3}, 3]$ (b) $[1, \infty[$ (c) $]0, 1]$ (d) $[0, \frac{1}{3}]$
- (2) A body of weight 1 newton is placed on a horizontal rough plane, the coefficient of friction between it and the body is $\sqrt{3}$, a horizontal force acted on it trying to move it, then the resultant reaction force $\in$
- (a) $]0, 1]$ (b) $]1, 2]$ (c) $\{1, 2\}$ (d) $\{2\}$
- (3) A body of weight 10 kg.wt. rests on a rough horizontal table, a force of magnitude 20 kg.wt. acts on it inclined to the horizontal upward at an angle of measure 30° , then the friction force = kg.wt.
- (a) zero (b) 10 (c) $10\sqrt{3}$ (d) 20
- (4) A body of weight (W) newton is placed on a rough horizontal plane. The coefficient of static friction between the body and the plane equals $\frac{\sqrt{3}}{3}$. A horizontal force of magnitude (F) N. acts on the body. If the body is in equilibrium, then measure of the angle between the resultant reaction and the normal reaction $\in$
- (a) $\{\frac{\pi}{4}\}$ (b) $\{\frac{\pi}{3}\}$ (c) $]0, \frac{\pi}{6}]$ (d) $]0, \frac{\pi}{3}]$
- (5) A body of weight (w) newton is placed on a rough horizontal plane. The coefficient of static friction between the body and the plane = $\frac{1}{4}$. A horizontal force acts on the body to move it such that the friction force $\in]0, 4]$, then w = N.
- (a) 1 (b) 4 (c) 8 (d) 16
- (6) In the opposite figure :
- A body of weight (w) newton placed on a rough horizontal plane. A horizontal force of magnitude F newton acts on the body trying to move it. If the resultant reaction in newton $\in]6, 12]$, then the measure of the angle of friction is°
- (a) 15 (b) 30 (c) 60 (d) 45



Equilibrium of a body on a rough inclined plane



From the school book

Remember

Understand

Apply

Higher Order Thinking Skills

First Multiple choice questions

Choose the correct answer from the given ones :

- (1) A body of weight 6 N, was placed on a rough inclined plane so it was about to slide if the magnitude of the limiting friction was $3\sqrt{3}$ N, then the measure of the inclination angle of the plane to the horizontal equals°

(a) 30 (b) 45 (c) 60 (d) 90
- (2) A body is placed on a rough inclined plane and the angle of friction between the body and the plane is λ , the plane makes an angle of measure θ , then the body is in equilibrium if and only if

(a) $\theta > \lambda$ (b) $\theta \geq \lambda$ (c) $\theta \leq \lambda$ (d) $\theta = 2\lambda$
- (3) A body is placed on a rough inclined plane it makes an angle of measure θ to the horizontal. The coefficient of friction between the body and the plane is $\frac{\sqrt{3}}{3}$ if the body is in equilibrium on the plane, then

(a) $\theta = 30^\circ$ (b) $\theta > 30^\circ$ (c) $\theta \leq 30^\circ$ (d) $30^\circ \leq \theta < 90^\circ$
- (4) If the coefficient of static friction between a body and an inclined rough plane equals $\sqrt{3}$, then the measure of the inclination angle of the plane to the horizontal when the body is about to slide under effect of its weight only =

(a) 30° (b) 45° (c) 60° (d) 75°

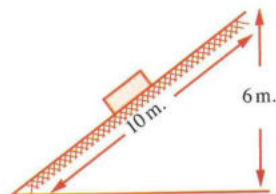
- (5) A body is placed on a rough inclined plane makes an angle of measure $\sin^{-1} \frac{5}{13}$ and it was about to slide under effect of its weight only, then the coefficient of static friction between the body and the plane equals
- (a) $\frac{5}{13}$ (b) $\frac{5}{12}$ (c) $\frac{12}{13}$ (d) $\frac{12}{5}$

- (6) In the opposite figure :

The body is about to slide downwards

, then the coefficient of static friction =

- (a) $\frac{3}{5}$ (b) $\frac{4}{5}$
(c) $\frac{3}{4}$ (d) $\frac{4}{3}$



- (7) A body is placed on a rough plane inclined to horizontal at an angle equals the measure of the friction angle, then the body

- (a) is at rest on the plane but not about to move.
(b) moves on the plane.
(c) is about to move downward the plane.
(d) is about to move upwards the plane.

- (8) A body is placed on an inclined rough plane makes an angle of measure 60° and the coefficient of static friction between the body and the plane is $\frac{\sqrt{3}}{6}$, then the body
- (a) is about to move up the plane. (b) is about to move down the plane.
(c) moves on the plane. (d) remains at rest but not about to move.

- (9) A body whose mass 4 kg. is placed on a rough inclined plane makes an angle of measure 30° with the horizontal and the coefficient of friction between the body and the plane is $\frac{\sqrt{3}}{2}$ the body

- (a) is about to move up the plane. (b) is about to move down the plane.
(c) moves on the plane. (d) remains at rest but not about to move.

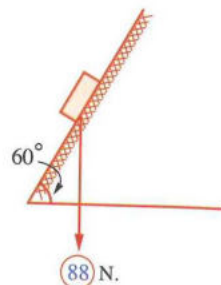
- (10) A body is placed on an inclined rough plane and it was about to slide. When the inclination angle to the horizontal is increased, the body moved downward, then the magnitude of the friction force at this moment

- (a) vanished. (b) decreases.
(c) increases. (d) increases to infinity.

(11) In the opposite figure :

A body of weight 88 newtons placed on a rough inclined plane makes with the horizontal an angle of measure 60° . If the body about to slide , then the magnitude of the limiting static friction = newtons

- (a) $22\sqrt{3}$ (b) $44\sqrt{3}$ (c) 22 (d) 44



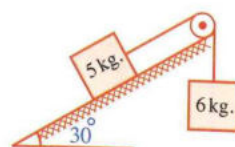
(12) A body of weight 10 N. is placed on a rough plane inclined to the horizontal at an angle of measure θ , the body is about to move under action of its weight only. If another body made of the same material , and of weight 20 N. is placed on the same inclined plane , then the second body will

- (a) be about to move down.
(b) be in equilibrium but it is not about to move.
(c) slide downward.
(d) be about to move up.

(13) In the opposite figure :

A body of mass 5 kg. is placed on a rough inclined plane, connected with light string passes over a smooth pulley at the edge of the plane and the other end of the string tied to a body of mass 6 kg. If the system is in equilibrium , then the magnitude and the direction of the friction force is

- (a) 3.5 kg.wt. upward. (b) 3.5 kg.wt. downward.
(c) 8.5 kg.wt. upward. (d) 8.5 kg.wt. downward.



(14) If a body is placed on a rough inclined plane, makes an angle of measure 30° to the horizontal , so immediately it slides downward , then

- (a) the angle of friction = 30°
(b) the coefficient of static friction $\mu_s < \frac{\sqrt{3}}{3}$
(c) the coefficient of kinetic friction $\mu_k > \frac{\sqrt{3}}{3}$
(d) the body weight equals the kinetic friction force.

(15) If a body is placed on a rough inclined plane and it was about to slide , then tangent of the friction angle is equal to each of the following except

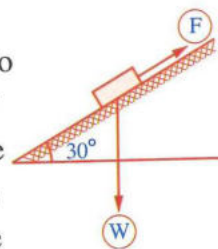
- (a) the coefficient of friction.
(b) the ratio between the normal reaction and the magnitude of the resultant reaction.
(c) tangent of the inclination angle between the plane and the horizontal.
(d) the ratio between the limiting friction and the magnitude of normal reaction.

(16) A body of weight (W) N. is placed on a rough inclined plane. It makes an angle of measure (θ) to the horizontal. The coefficient of friction between the body and the plane equals (μ), then the magnitude of the tangential force that acts on the body and makes the friction vanished equals N.

- (a) μW (b) $\mu \cos \theta$ (c) $\mu W \cos \theta$ (d) $W \sin \theta$

(17) In the opposite figure :

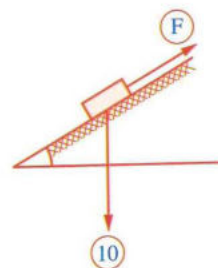
A body of weight (W) newton is placed on a rough plane inclined to the horizontal by an angle of measure 30° , a force of magnitude F newton in the direction of the line of the greatest slope upwards the plane acts on it to make the body about to move upwards when the magnitude of the resultant reaction between the body and the plane equals (W) newton, then $F = \dots\dots\dots$ newton.



- (a) W (b) $\frac{\sqrt{3}}{2} W$ (c) $\frac{1}{2} W$ (d) $\sqrt{3} W$

(18) (2nd Session 2022) In the opposite figure :

A body of weight 10 newton is placed on a rough plane inclined to the horizontal by an angle whose sine is $\frac{3}{5}$, the coefficient of the static friction between the body and the plane equals $\frac{1}{4}$, a force of magnitude F newton acts on the body in the direction of the line of the greatest slope upward to make it about to move upward, then $F = \dots\dots\dots$ newton.



- (a) 8 (b) 10 (c) 6 (d) 4

(19) A body of weight 4 kg.wt. is placed on a rough plane inclined to the horizontal at an angle of measure 45° . The coefficient of static friction between them is $\mu_s = \frac{1}{2}$, then the greatest force can preserve the body equilibrium acting in direction of the line of the greatest slope of the plane is kg.wt.

- (a) $3\sqrt{2}$ (b) $2\sqrt{2}$ (c) $\sqrt{2}$ (d) $\frac{1}{\sqrt{2}}$

(20) A body of weight (W) is placed on a rough inclined plane makes with the horizontal an angle of measure θ and force of magnitude (W) acts on it in direction of the line of greatest slope of the plane and the body is about to move up, then $\mu_s + \tan \theta = \dots\dots\dots$

- (a) $\sec \theta$ (b) $\csc \theta$ (c) $\sin \theta$ (d) $\cos \theta$

(21) A body of weight 50 N. is placed on a rough inclined plane. Force $\vec{P}$ acts on it in direction of the line of greatest slope of the plane up. If you know that the body is about to move up the plane when $P = 30$ N. and it is about to move down when $P = 20$ N., then the coefficient of static friction between the body and the plane =

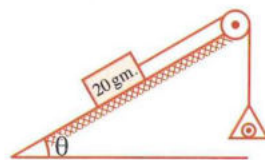
- (a) $\frac{\sqrt{3}}{5}$ (b) $\frac{\sqrt{3}}{15}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{1}{3}$

(22) A body of weight (W) gm.wt. is placed on a horizontal rough plane. A horizontal force of magnitude 100 gm.wt. acts on it. It makes it about to move. The plane has been tilted 45° to the horizontal and force of magnitude $150\sqrt{2}$ gm.wt. acts on the body in direction of the line of greatest slope up the body now is about to slide, then the coefficient of static friction between the body and the plane =

- (a) $\frac{3}{4}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{\sqrt{2}}$

(23) In the opposite figure :

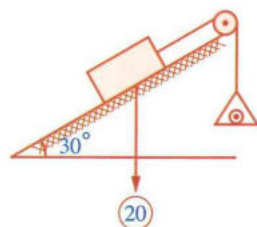
$\tan \theta = \frac{4}{3}$, and the scale pan mass is 7 gm. and the mass of the body on the inclined plane = 20 gm. The coefficient of static friction between the body and the plane equals $\frac{1}{6}$, then the mass should be on the scale pan to vanish the friction force = gm.



- (a) 9 (b) 10 (c) 11 (d) 12

(24) In the opposite figure :

A body of weight 20 kg.wt. is placed on a rough plane inclined to the horizontal with an angle of measure 30° and tied from a point on it by a light inelastic string passes over a smooth pulley at the edge of the plane and a weight is suspended on the other end of the string on a scale pan of weight $\frac{1}{2}$ kg.wt. If the coefficient of static friction between the body and the plane is $\frac{1}{2\sqrt{3}}$, then the least weight that should be put in the scale pan to prevent the body from sliding is kg.wt.



- (a) 15 (b) $14\frac{1}{2}$ (c) 5 (d) $4\frac{1}{2}$

Second Essay questions

1 A body is placed on a rough inclined plane, making with the horizontal an angle of measure 60° , the coefficient of static friction between the body and the plane = $\frac{\sqrt{3}}{6}$. Show with reason that the body will not stay in equilibrium.

2 A body of weight 38 kg.wt. is about to move under its own weight when placed on a rough plane which is inclined to the horizontal with an angle whose tangent is $\frac{1}{4}$. If the body is placed on a horizontal plane which is as rough as the inclined plane and is acted on by an upward pull in a direction inclined to the horizontal with an angle whose $\tan$ is $\frac{3}{4}$ so that the motion is about to begin. Find the magnitude of this force and the normal reaction.

« 10, 32 kg.wt. »

- 3** A body of weight 4 newton is placed on a rough plane inclined to the horizontal with an angle of measure 30° , the coefficient of static friction between the body and the plane equals $\frac{\sqrt{3}}{4}$. A force of magnitude $\frac{1}{2}$ newton acts on the body in the direction of the line of the greatest slope upwards. If the body is in equilibrium, determine the friction force and show whether the body is about to start motion or not.
« 1.5 newton upwards, The body is about to start motion »
-
- 4**  A body of weight 3 newton is placed on a plane inclined at 30° to the horizontal and the coefficient of static friction between the weight and the plane is $\frac{2}{3}$, a 2 newton force is acting on the body upwards along the line of the greatest slope. Given that the body is at rest, find the force of friction and investigate whether or not the motion is about to begin.
« $\frac{1}{2}$ newton downwards, and the body is not about to move »
-
- 5** A body of weight 60 kg.wt. is placed on a rough plane inclined to the horizontal with an angle of measure 30° . The body is pulled upwards by a force parallel to the line of the greatest slope which make the body about to start motion upwards. If the coefficient of static friction between the body and the plane equals $\frac{1}{\sqrt{3}}$. Find the pull force.
« 60 kg.wt. »
-
- 6** A body of weight 15 newton is placed on a rough plane inclined to the horizontal with an angle whose sine $\frac{3}{5}$, the body is pulled upwards by a force parallel to the line of the greatest slope, then it becomes about to begin motion upwards the plane. If the pull force is of magnitude of 13 newton. Find the coefficient of friction between the body and the plane.
« $\frac{1}{3}$ »
-
- 7** A body of weight 20 kg.wt. is rested on a rough plane inclined to the horizontal with an angle of tangent $\frac{3}{4}$. If the least force which acts on the body in the direction of the plane upwards to keep the equilibrium of the body is 8 kg.wt. Find the measure of the angle of friction between the body and the plane.
« $14^\circ 2'$ »
-
- 8** A body of weight 25 kg.wt. is placed on a rough plane inclined to the horizontal with the angle whose sine is $\frac{3}{5}$. If the coefficient of static friction between the body and the plane = $\frac{1}{5}$. Find the magnitude of the least force acting on the body parallel to the plane to prevent sliding the body down.
« 11 kg.wt. »

- 9** A body of weight 15 newton is placed on a rough plane inclined to the horizontal with an angle whose cosine is $\frac{4}{5}$, the measure of the angle of friction between the body and the plane is 45° , show that the body will stay in equilibrium, then find the magnitude of the force which acts on the body in the direction of the line of the greatest slope downwards to make the body about to move. « 3 newton »

- 10** A body of weight 18 kg.wt. is placed on a rough plane when the plane inclines to the horizontal with an angle of measure 60° , the body was about to slide down. If the measure of the angle of inclination decreases to be 30° , find the force of friction and the magnitude of the force which acts on the body at then in the direction of the line of the greatest slope to make the body about to slide down. « 9, 18 kg.wt. »

- 11**  A body of weight 30 newton is placed on a rough inclined plane. When the plane is inclined at 30° to the horizontal, the body is about to slide down. If the measure of the inclination angle of the plane to the horizontal is increased to be 60° . Calculate the magnitude of :
- (1) The least force act on the body and is parallel to the line of greatest slope to prevent the body sliding.
- (2) The force act on the body and is parallel to the line of greatest slope to make the body about to move upwards. « $10\sqrt{3}$, $20\sqrt{3}$ newton. »

- 12** A body of mass 4 kg. is placed on a rough plane inclining to the horizontal with an angle of measure 30° and the coefficient of static friction between the body and the plane is $\frac{\sqrt{3}}{2}$. Show if the body slides on the plane or about to slide or the friction is not limiting. Then find the magnitude and the direction of the force of friction. If a force parallel to the line of the greatest slope of the plane acts on the body. Find the magnitude and the direction of this force so that :

- (1)  The body is about to move upwards the plane.
- (2) The body is about to slide down the plane. « 2, 5, 1 kg.wt. »

- 13** A 130 newton weight is placed on a plane which is inclined to the horizontal with an angle whose cosine is $\frac{5}{13}$ and there is a force applied to the weight parallel to the line of the greatest slope upwards. If the coefficient of static friction between the weight and the plane is $\frac{2}{5}$. Find the limits between which the applied force lies, so as to make the weight in equilibrium on the plane. « 140, 100 newtons »

- 14**  A body of weight 50 N. is placed on a rough plane which inclined to the horizontal at angle of measure θ . If the magnitudes of the least and greatest forces which applied parallel to the line of greatest slope and makes the body in equilibrium on the plane are 10 N. , 40 N. respectively. Find the coefficient of static friction and the measure of the angle of inclination of the plane to the horizontal. « $\frac{\sqrt{3}}{5}$, 30° »

- 15** A body is placed on a rough plane which is inclined to the horizontal at 30° . $\vec{F}$ is a force parallel to the plane acts in the direction of the line of the greatest slope upwards , if $F = 1$ kg.wt. the body will be about to move downwards and if $F = 3$ kg.wt. the body will be about to move upwards. Find the weight of the body and the coefficient of static friction between the body and the plane. « 4 kg.wt. , $\frac{1}{6}\sqrt{3}$ »

- 16** A body of weight 500 gm.wt. is placed on a rough plane which is inclined to the horizontal at θ° where $\tan \theta = \frac{4}{3}$, then it is connected by a string passing over a smooth pulley at the top of the plane , from the other end of the string a scale pan of weight 25 gm.wt. is attached. If the magnitude of the least weight should be put on the scale pan so that the body stay in equilibrium is 175 gm.wt. Find the coefficient of static friction , then prove that the magnitude of the greatest weight that should be put in the scale pan such that equilibrium is kept is 575 gm.wt. « $\frac{2}{3}$ »

Third Higher skills

1 Choose the correct answer from the given ones :

- (1)** A body of weight 8 kg.wt. is placed on a rough inclined plane makes with the horizontal an angle of measure 30° . The coefficient of friction between the body and the plane $\mu_s = \frac{1}{2\sqrt{3}}$ Force of magnitude P acts on it in direction of the line of greatest slope of the plane , then :

First : P kg.wt. which makes the body about to move $\in$

- (a) {2} (b) {6} (c) {2 , 6} (d) [2 , 6]

Second : P kg.wt. which keeps the body in equilibrium $\in$

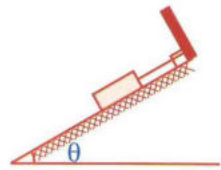
- (a) {2} (b) {6} (c) {2 , 6} (d) [2 , 6]

- (2)** A body of weight 50 N. is placed on a rough inclined plane. Force of magnitude P acts on it in direction of the line of the greatest slope of the plane up. If the magnitude of P (in newton) which keeps the body in equilibrium belongs to the interval [20 , 30] , then the coefficient of static friction between the body and the plane =

- (a) $\frac{\sqrt{3}}{15}$ (b) $\frac{1}{2}$ (c) $\frac{15}{\sqrt{3}}$ (d) $\frac{1}{3}$

(3) In the opposite figure :

If a body of weight 5 kg.wt. is placed on a rough plane inclined to the horizontal at an angle of measure θ where $\sin \theta = \frac{3}{5}$ It is tied to one end of a light inextensible string and the other end of the string is tied to a perpendicular barrier to the plane such that the string is parallel to the line of greatest slope of the plane. If the coefficient of static friction between the body and the plane is 0.8 , then the magnitude of the tension in the string = kg.wt.



- (a) zero (b) 3 (c) 3.2 (d) 4

- 2 A body of weight 60 kg.wt. is placed on a rough plane inclining to the horizontal with an angle of measure 30° and the coefficient of static friction between the body and the plane $\frac{\sqrt{3}}{3}$. The body is pulled upwards with a force making with the plane an angle of measure 30° to make the body about to move upwards the plane. Find the magnitude of this force.

« $30\sqrt{3}$ kg.wt. »

- 3 A body of weight 30 newton is placed on a rough plane, inclined to the horizontal with an angle whose tangent is $\frac{12}{5}$ and the coefficient of static friction between the body and the plane is $\frac{2}{3}$, find the magnitude of the horizontal force which acts on the body and it lies in the vertical plane containing the line of the greatest slope of the plane at which the body about to slide down.

« 20 newton. »

حمل الآن

مجاناً وحصرياً

المراجعة رقم (3)

اختبار شهر نوفمبر





Classroom Performance (Week Six) - Mathematics Applications

- (1) A body of weight (W) Newton is placed on a smooth plane inclined to the horizontal at an angle of measure 45° and the body is kept in equilibrium by the effect of a force of magnitude $40\sqrt{2}$ Newton acting in the direction of the line of greatest slope of the plane upwards. Find the magnitude of the body's weight and the magnitude of the plane's reaction on the body.
- (2) A body of weight 24 Newton is placed on a smooth plane inclined to the horizontal at an angle of measure 30° and the body is prevented from sliding by the effect of a force of magnitude (F) Newton inclined to the direction of the line of greatest slope of the plane upwards at an angle of measure 30° . Find the magnitude of the plane's reaction on the body.
- (3) A body of weight 20 gm.wt. is placed on a smooth plane inclined to the horizontal at an angle of measure θ , where $\cos \theta = \frac{4}{5}$, the body is kept in equilibrium by a horizontal force of magnitude (F) gm.wt. Find the magnitude of this force and the magnitude of the plane's reaction on the body.
- (4) A body of weight (W) Newton placed on a smooth plane inclined to the horizontal at an angle of measure 60° is kept in equilibrium by the effect of a horizontal force of magnitude $60\sqrt{3}$ Newton. Find the magnitude of the body's weight and the magnitude of the plane's reaction on the body.

- (5) A body of weight 200 gm .wt. is placed on a smooth plane inclined to the horizontal at an angle of measure θ , where $\tan \theta = \frac{3}{4}$, where the body's equilibrium is maintained by a force of magnitude (F) gm.wt tending in the direction of the line of the greatest slope of the plane upwards at an angle of α , where $\tan \alpha = \frac{5}{12}$, Find the magnitude of this force and the reaction of the plane on the body.
- (6) A body of weight 48 Newton is placed on a smooth plane inclined to the horizontal at an angle of measure 30° , where the body's equilibrium is maintained by a tension force of magnitude $16\sqrt{3}$ N, which is inclined in the direction of the line of greatest slope of the plane upwards at an angle of measure θ . Find the measure of the angle θ , and the magnitude of the reaction of the plane on the body in the equilibrium state.
- (7) A smooth ball with a radius of 60 cm. and a weight of 500 gm.wt. is resting on a smooth vertical wall suspended by a light string 40 cm. long, one end of which is fixed to the surface of the ball and the other end is fixed to a point on the wall located vertically above the point of contact of the ball with the wall. Find the magnitude of the tension in the string and the magnitude of the reaction of the wall in a state of equilibrium.
- (8) A smooth ball weighing $10\sqrt{3}$ gm.wt rests on a smooth vertical wall and is suspended from one of its surface points by a string whose other end is fixed at a point on the wall located vertically above the point of contact of the ball. The string makes an angle with the vertical of measure 30° . Find the magnitude of the tension in the string and the magnitude of wall reaction.



- (9) A smooth ball of weight 45 Newton rests on a smooth wall and is suspended by a string whose one end is fixed at a point on its surface and the other end at a point on the wall located vertically exactly above the point of contact of the ball. If the length of the string is twice the length of the radius of the ball, find the magnitude of the wall reaction and the magnitude of the tension in the string in the equilibrium position.
- (10) A smooth ball of weight 100 Newton is stable between a smooth vertical wall and a smooth inclined plane inclined to the horizontal at an angle of measure 60° . Find the magnitude of wall reaction and the magnitude of plane reaction.
- (11) A uniform rod $\overline{AB}$, 80 cm long and its weight is 50 gm.wt., is suspended from its ends A and B by two light strings, the ends of which are fixed at a point C on the ceiling. The two strings are perpendicular and $AC = 40$ cm long. The rod is in equilibrium. Find the magnitude of the tension in each string.
- (12) A uniform rod of weight 20 gm.wt. is placed on two smooth, opposite planes inclined to the horizontal at two angles of measures 30° and 60° , such that the rod and the line of greatest slope of the two planes lie in the same vertical plane. Find the magnitude of the pressure on each of the two planes in a state of equilibrium
- (13) A uniform rod $\overline{AB}$, 16 cm. long and of weight 400 gm.wt., has one end A connected to a joint fixed in a vertical wall and the other end B tied to a light string, 20 cm long, fixed at a point C on the vertical wall located vertically above A. The rod is in equilibrium in a horizontal position. Find the magnitude of tension in the string and the magnitude of joint reaction.



- (14) A uniform rod $\overline{AB}$, 50 cm long and of weight 240 gm.wt, has one end A connected to a hinge fixed in a vertical wall and the other end B is tied to a light string of length 20 cm, whose end is fixed at a point C on the vertical wall located vertically above A and at a distance of 120 cm from A the equilibrium of the rod in a horizontal position. Find the magnitude of the tension in the string and the magnitude and direction of the hinge reaction in stste of equilibrium.
- (15) A uniform rod $\overline{AB}$, 80 cm long and of weight 50 gm.wt, has its end A connected to a hinge fixed in a vertical wall and a horizontal force has affected its end B. The rod is in equilibrium in a position that is inclined to the horizontal at an angle of measure 45° . Find the magnitude of the horizontal force and the magnitude of the hinge reaction.



Homework (Week Six) - Mathematics Applications

- (1) A body of weight (W) Newton is placed on a smooth plane inclined to the horizontal at an angle of measure 30° and the body is kept in equilibrium by the effect of a force of magnitude 36 Newton acting in the direction of the line of greatest slope of the plane upwards. Find the magnitude of the body's weight and the magnitude of the plane's reaction on the body.
- (2) A body of weight 18 Newton is placed on a smooth plane inclined to the horizontal at an angle of measure 30° and the body is prevented from sliding by the effect of a force of magnitude (F) Newton inclined in the direction of the line of greatest slope of the plane upwards at an angle of measure 30° . Find the magnitude of the plane's reaction on the body.
- (3) A body of weight 800 gm.wt is placed on a smooth plane inclined to the horizontal at an angle of measure θ , where $\sin \theta = \frac{6}{10}$, the body is kept in equilibrium by a horizontal force of magnitude (F) gm.wt Find the magnitude of this force and the magnitude of the plane's reaction on the body.
- (4) A body of weight (W) Newton placed on a smooth plane inclined to the horizontal at an angle of measure 45° is balanced by the effect of a horizontal force of magnitude $20\sqrt{2}$ Newton. Find the magnitude of the body's weight and the magnitude of the plane's reaction on the body.

- (5) A body of weight 260 gm.wt. is placed on a smooth plane inclined to the horizontal at an angle of measure θ where $\tan \theta = \frac{5}{12}$, where the body's equilibrium is maintained by a force of magnitude (F) gm.wt tending in the direction of the line of the greatest slope of the plane upwards at an angle of α where $\tan \alpha = \frac{3}{4}$, Find the magnitude of this force and the reaction of the plane on the body.
- (6) A body of weight 18 N is placed on a smooth plane inclined to the horizontal at an angle of measure 30° , where the body's equilibrium is maintained by a tension force of magnitude $6\sqrt{3}$ N, which is inclined in the direction of the line of greatest slope of the plane upwards at an angle of measure θ , Find the measure of the angle θ and the magnitude of the reaction of the plane on the body are found.
- (7) A smooth ball with a radius of 30 cm and a weight of 200 gm.wt. is resting on a smooth vertical wall suspended by a light string 20 cm long, one end of which is fixed to the surface of the ball and the other end is fixed to a point on the wall located vertically above the point of contact of the ball with the wall. Find the magnitude of the tension in the string and the magnitude of the reaction of the wall in a state of equilibrium.
- (8) A smooth ball weighing $50\sqrt{2}$ gm.wt rests on a smooth vertical wall and is suspended from one of its surface points by a string whose other end is fixed at a point on the wall located vertically above the point of contact of the ball. The string makes an angle with the vertical of measure 45° . Find the magnitude of the tension in the string and the magnitude of wall reaction.



- (9) A smooth ball of weight $90\sqrt{2}$ Newton rests on a smooth wall and is suspended by a string whose one end is fixed at a point on its surface and the other end at a point on the wall located vertically exactly above the point of contact of the ball. If the length of the string is twice the length of the radius of the ball, find the magnitude of the wall reaction and the magnitude of the tension in the string in the equilibrium position.
- (10) A smooth ball of weight 60 Newton is stable between a smooth vertical wall and a smooth inclined plane inclined to the horizontal at an angle of measure 30° . Find the magnitude of wall reaction and the magnitude of plane reaction.
- (11) A uniform rod $\overline{AB}$, 100 cm long and its weight is 300 gm.wt., is suspended from its two ends A and B by two light strings, the ends of which are fixed at a point C on the ceiling. The strings are perpendicular and $AC = 50$ cm long. The rod is in equilibrium. Find the magnitude of the tension in each string.
- (12) A uniform rod, 100 gm.wt, is resting on one end of a smooth vertical wall and the other end on a smooth inclined plane inclined to the horizontal at an angle of measure 30° . Find the magnitude of each of the wall and plane reaction.
- (13) A uniform rod $\overline{AB}$, 12 cm long and of weight 180 gm.wt, has one end connected to a hinge fixed in a vertical wall and the other end tied to a light string, 15 cm long, fixed at point C on the vertical wall located vertically above point A. The rod is in equilibrium in a horizontal position. Find the magnitude of tension in the string and the magnitude of hinge reaction.

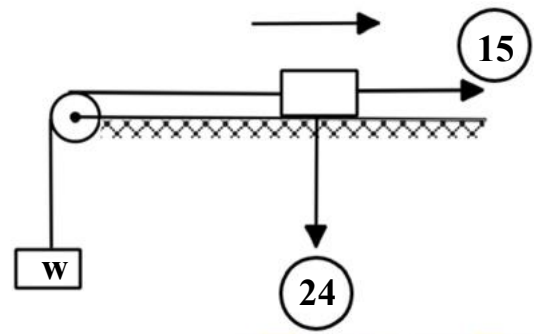
- (14) A uniform rod $\overline{AB}$, 60 cm long and of weight 32 gm.wt, has one end a connected to a hinge fixed in a vertical wall and the other end B is tied to a light string whose end is fixed at a point C on the vertical wall located vertically above A and at a distance of 80 cm from A the equilibrium of the rod in a horizontal position. Find the magnitude of the tension in the string and the magnitude and direction of the hinge reaction in case of equilibrium.
- (15) A uniform rod $\overline{AB}$, 20 cm long and of weight 60 Newton, has its end A connected to a joint fixed in a vertical wall and a horizontal force has affected its end B. The rod is balanced in a position that is inclined to the horizontal at an angle of measure 30° . Find the magnitude of the horizontal force and the magnitude of the joint reaction.



Classroom Performance (Week Seven) - Mathematics Applications

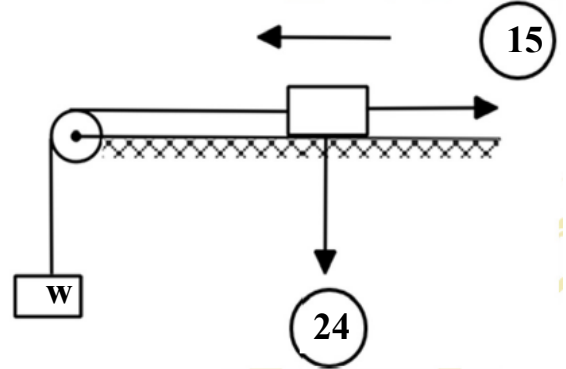
- (1) A person pushes a body of weight 105 Newtons with a horizontal force of magnitude 70 Newtons on a rough horizontal ground, and the body was about to move. Find the coefficient of static friction between the body and the ground.**
- (2) A body of weight 100 Newtons was placed on a rough horizontal plane, the coefficient of static friction between it and the body is $\frac{3}{4}$. Find the magnitude of the horizontal force that makes the body about to move on the plane.**
- (3) A body of weight 135 dynes was placed on a rough horizontal plane, the coefficient of static friction between it and the body is $\frac{\sqrt{3}}{3}$. Find the magnitude of the horizontal force that makes the body about to move on the plane, as well as the magnitude of the resulting reaction.**
- (4) A body of weight 50 Newtons was placed on a rough horizontal plane, the coefficient of static friction between it and the body is $\frac{3}{5}$. If a horizontal force of 20 Newtons acts on it, find the magnitude of the friction force.**
- (5) A body of weight 14 Newtons was placed on a rough horizontal plane and tied to a horizontal string passing over a small smooth pulley fixed at the edge of the plane and a weight of magnitude 7 Newtons was hanging from the other end. The body was about to move. Find the magnitude of the frictional force and the coefficient of static friction between the body and the plane.**

- (6) A body of weight (W) Newton was placed on a rough horizontal plane. the coefficient of static friction between the body and the plane is $\frac{1}{4}$. If a horizontal force of 25 Newtons acts on it, it would make it about to move. Find the magnitude of the body's weight.
- (7) A body of weight 7 Newtons was placed on a rough horizontal plane. The coefficient of static friction between it and the body is $\frac{3}{7}$. If a horizontal force was applied to it, it would try to move it. Find the interval to which the frictional force belongs.
- (8) A body of weight 27 Newtons was placed on a rough horizontal plane . a horizontal force of magnitude 9 Newtons was applied to it, so the body was about to move. If the weight of the body increased by 18 Newtons. Find the magnitude of the horizontal force that would make the body about to move in this case.
- (9) A body of weight 50 Newtons was placed on a rough horizontal plane. A horizontal force of magnitude 25 Newton acted on it, causing the body is about to move. Find the magnitude of the resulting reaction.
- (10) A body of weight 60 Newtons was placed on a rough horizontal plane. The coefficient of static friction between it and the body is $\frac{3}{5}$, the body was affected by a horizontal force that caused it about to move on the plane. Find the magnitude and direction of the resulting reaction.
- (11) In the opposite figure:
If the coefficient of static friction between the body and the plane is equal to $\frac{1}{3}$, Find the magnitude of (W) so that the body is about to move in the direction of the force of 15 Newtons.



(12) In the opposite figure:

If the coefficient of static friction between the body and the plane is equal to $\frac{1}{3}$, Find the magnitude of (W) so that the body is about to move in the direction opposite to the force of 15 Newtons.



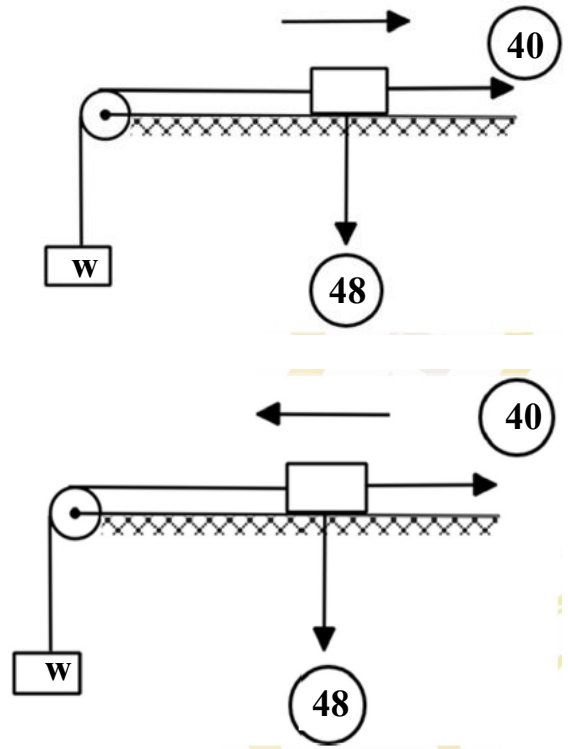
- (13) A body of weight 260 Newtons is placed on a rough horizontal plane and is to be pulled with a rope inclined upwards at an angle of measure 30° . If the coefficient of static friction is equal to $\frac{\sqrt{3}}{3}$, find the magnitude of tension required to make the body is about to move.
- (14) A body weighing $6\sqrt{3}$ Newtons is placed on a rough horizontal plane and a force of $6\sqrt{3}$ Newtons acts on it in a direction that makes an angle of measure 30° with the plane downwards, making the body is about to move, Find the coefficient of static friction between the body and the plane.
- (15) A body of weight 20 Newtons is placed on a rough horizontal plane and a force of $10\sqrt{2}$ Newtons acts on it in a direction that makes an angle of measure 45° with the plane downwards, making the body is about to move. Find the coefficient of static friction between the body and the plane as well as the magnitude of the resulting reaction.



Homework (Week Seven) - Mathematics Applications

- (1) A person pushes a body of weight 75 Newtons with a horizontal force of 45 Newtons on a rough horizontal ground, and the body was about to move. Find the coefficient of static friction between the body and the ground.
- (2) A body of weight 90 Newtons was placed on a rough horizontal plane. the coefficient of static friction between it and the body is $\frac{3}{5}$. Find the magnitude of the horizontal force that makes the body about to move on the plane.
- (3) A body of weight 30 dynes was placed on a rough horizontal plane. The coefficient of static friction between it and the body is $\frac{\sqrt{3}}{3}$. Find the magnitude of the horizontal force that makes the body about to move on the plane, as well as the magnitude of the resulting reaction.
- (4) A body of weight 27 Newtons was placed on a rough horizontal plane. The coefficient of static friction between it and the body is $\frac{2}{3}$. If a horizontal force of 15 Newtons acts on it, find the magnitude of the friction force.
- (5) A body of weight 15 Newtons was placed on a rough horizontal plane and tied to a horizontal string passing over a small smooth pulley fixed at the edge of the plane and a weight of 3 Newtons was hanging from the other end. The body was about to move. Find the magnitude of the frictional force and the coefficient of static friction between the body and the plane.
- (6) A body of weight (W) Newton was placed on a rough horizontal plane. the coefficient of static friction between the body and the plane is $\frac{1}{3}$. If a horizontal force of 27 Newtons acts on it, it would make it about to move. Find the magnitude of the body's weight.

- (7) A body of weight 5 Newtons was placed on a rough horizontal plane. The coefficient of static friction between it and the body is $\frac{2}{5}$. If a horizontal force was applied to it, it would try to move it. Find the interval to which the frictional force belongs.
- (8) A body of weight 15 Newtons was placed on a rough horizontal plane . a horizontal force of 12 Newtons acts on it, so the body was about to move. If the weight of the body increased by 13 Newtons. Find the magnitude of the horizontal force that would make the body about to move in this case.
- (9) A body of weight 15 Newtons was placed on a rough horizontal plane. A horizontal force of 7.5 Newton acted on it, causing the body is about to move. Find the magnitude of the resulting reaction.
- (10) A body of weight 50 Newtons was placed on a rough horizontal plane. The coefficient of static friction between it and the body is $\frac{2}{5}$, the body was affected by a horizontal force that caused it about to move on the plane. Find the magnitude and direction of the resulting reaction.
- (11) In the opposite figure:
If the coefficient of static friction between the body and the plane is equal to $\frac{1}{2}$, find the magnitude of (W) so that the body is about to move in the direction of the force of 40 Newtons.
- (12) In the opposite figure:
If the coefficient of static friction between the body and the plane is equal to $\frac{1}{2}$, find the magnitude of (W) so that the body is about to move in the direction opposite to the force of 40 Newtons.





- (13) A body of weight 240 Newtons is placed on a rough horizontal plane and is to be pulled with a rope inclined upwards at an angle of measure 30° . If the coefficient of static friction is equal to $\frac{\sqrt{3}}{3}$, find the magnitude of tension required to make the body is about to move.
- (14) A body weighing $50\sqrt{3}$ Newtons is placed on a rough horizontal plane and a force of $50\sqrt{3}$ Newtons acts on it in a direction that makes an angle of measure 30° with the plane downwards, making the body is about to move , Find the coefficient of static friction between the body and the plane.
- (15) A body of weight 10 Newtons is placed on a rough horizontal plane and a force of $5\sqrt{2}$ Newtons acts on it in a direction that makes an angle of measure 45° with the plane downwards, making the body is about to move . Find the coefficient of static friction between the body and the plane as well as the magnitude of the resulting reaction.



Weekly Assessment (Week Seven) - Mathematics Applications

First Group

- (1) A person pushes a body of weight 175 Newtons with a horizontal force of 70 Newtons on a rough horizontal ground. The body was about to move. Find the coefficient of static friction between the body and the ground.
- (2) A body of weight 20 Newtons was placed on a rough horizontal plane. The coefficient of static friction between it and the body $\frac{4}{5}$. Find the magnitude of the horizontal force that makes the body about to move on the plane.
- (3) A body of weight 60 Newtons was placed on a rough horizontal plane. The coefficient of static friction between it and the body is $\frac{3}{4}$. If a horizontal force of 40 Newtons acts on it, find the magnitude of the frictional force.
- (4) A body of weight 16 Newtons was placed on a rough horizontal plane and tied to a horizontal string passing over a small smooth pulley fixed at the edge of the plane. A weight of 4 Newtons was hanging from the other end. The body was about to move. Find the magnitude of the frictional force and the coefficient of static friction between the body and the plane.
- (5) A body of weight $10\sqrt{3}$ Newton was placed on a rough horizontal plane and a force of $10\sqrt{3}$ Newton acts on it in a direction that makes an angle of measure 30° with the plane downward, making the body about to move. Find the coefficient of static friction between the body and the plane.



Second Group

- (1) A person pushes a body of weight 60 Newtons with a horizontal force of 45 Newtons on a rough horizontal ground, so the body was about to move. Find the coefficient of static friction between the body and the ground.
- (2) A body of weight 30 Newtons was placed on a rough horizontal plane. The coefficient of static friction between it and the body is $\frac{1}{2}$. Find the magnitude of the horizontal force that makes the body about to move on the plane.
- (3) A body of weight 20 Newtons was placed on a rough horizontal plane. The coefficient of static friction between it and the body is $\frac{4}{5}$, If a horizontal force of 12 Newtons was applied to it, find the magnitude of the friction force.
- (4) A body of weight 20 Newtons was placed on a rough horizontal plane and tied to a horizontal string passing over a small smooth pulley fixed at the edge of the plane and a weight of 5 Newtons was hanging from its other end. The body was about to move. Find the magnitude of the frictional force and the coefficient of static friction between the body and the plane.
- (5) A body weighing $30\sqrt{3}$ Newton was placed on a rough horizontal plane and a force of $30\sqrt{3}$ Newton acts on it in a direction that makes an angle of measure 30° with the plane downwards, making the body about to move. Find the coefficient of static friction between the body and the plane.



Third Group

- (1) A person pushes a body of weight 80 Newtons with a horizontal force of 40 Newtons on a rough horizontal ground. The body was about to move. Find the coefficient of static friction between the body and the ground.
- (2) A body of weight 60 Newtons was placed on a rough horizontal plane. the coefficient of static friction between it and the body is $\frac{3}{4}$. Find the magnitude of the horizontal force that makes the body about to move on the plane.
- (3) A body of weight 30 Newtons is placed on a rough horizontal plane. The coefficient of static friction between it and the body is $\frac{1}{2}$. If a horizontal force of 14 Newtons acts on it, find the magnitude of the friction force.
- (4) A body of weight 21 Newtons is placed on a rough horizontal plane and tied to a horizontal string passing over a small smooth pulley fixed at the edge of the plane. A weight of 7 Newtons hangs from its other end. The body is about to move. Find the magnitude of the friction force and the coefficient of static friction between the body and the plane.
- (5) A body weighing $20\sqrt{3}$ Newtons is placed on a rough horizontal plane and a force of $20\sqrt{3}$ Newton acts on it in a direction that makes an angle of measure 30° with the plane downward, making the body about to move. Find the coefficient of static friction between the body and the plane.



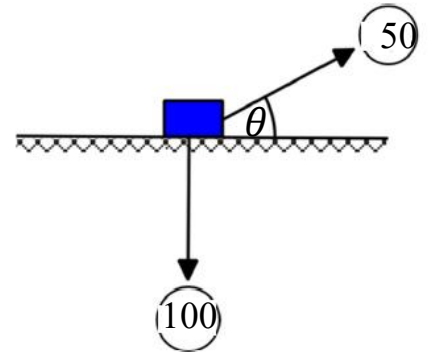
8 الأداء الصفي - الصف الثاني الثانوى - علمى - تطبيقات الرياضيات لغات - الأسبوع الثامن . 8

- 1) A body of weight 30 kg.wt is placed on a rough horizontal plane.
A horizontal force of magnitude F kg.wt acts upon it, making it about to move. If the measure of the angle between the resultant reaction and the limiting friction force is θ , where $\cos \theta = \frac{5}{13}$.
Find the magnitude of the resultant reaction.
- 2) A body of weight 24 kg.wt is placed on a rough horizontal plane.
A horizontal force is acts upon it, making it about to move. If the magnitude of resultant reaction is 30 kg.wt, find the coefficient of static friction between the body and the plane.
- 3) A horizontal force of magnitude 80 kg.wt is applied to a container of weight 80 kg,wt containing 24 boxes, each box of weight 20 kg,wt on a rough horizontal ground. The coefficient of static friction between it and the container is $\frac{1}{6}$, find the number of boxes that must be removed so that the container is about to move on the ground.
- 4) A body of weight 75 kg.wt was placed on a rough horizontal plane. Two horizontal forces of magnitudes 25 , 25 kg.wt were acting on the body in the same plane, enclosing an angle of measure 120° between them. The body was about to move. Find the coefficient of static friction between the body and the plane.
- 5) A body of weight 100 kg.wt was placed on a rough horizontal plane. two perpendicular horizontal forces of magnitudes 12, 16 kg.wt were acting on the body in the same plane. The body was about to move. Find the coefficient of static friction between the body and the plane.
- 6) A body of weight W kg.wt was placed on a rough horizontal plane.
The coefficient of static friction between it and the body was $\frac{1}{5}$,
affected by two horizontal forces of magnitudes 5, 8 kg.wt and the measure of the angle between them is 120° . The body was about to move.
Find the magnitude of W .

7) In the opposite figure:

If the coefficient of static friction

between the body and the rough plane is $\frac{\sqrt{3}}{3}$,
find the value of θ , if the body is about to move.
(Since the forces are measured in Newtons)

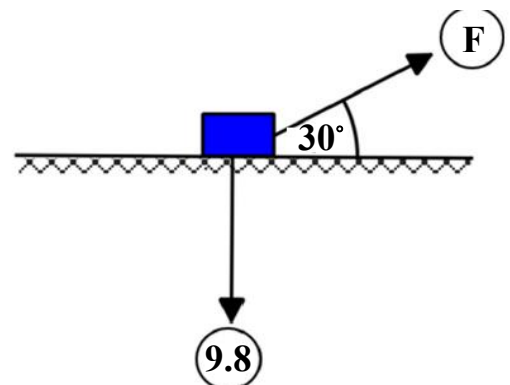


8) In the opposite figure:

If the coefficient of static friction

between the body and the plane is $\frac{30\sqrt{3}}{19}$
and the body is about to move,
find the value of: F.

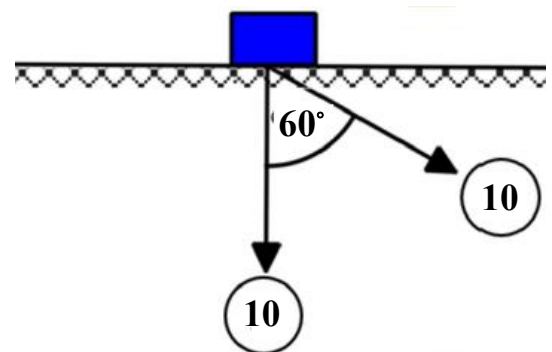
(Where the forces are measured in Newtons)



9) In the opposite figure:

If the body is balanced under
the action of the forces
shown in the figure on a rough
horizontal plane,
find the coefficient of static friction
between the body and the plane.

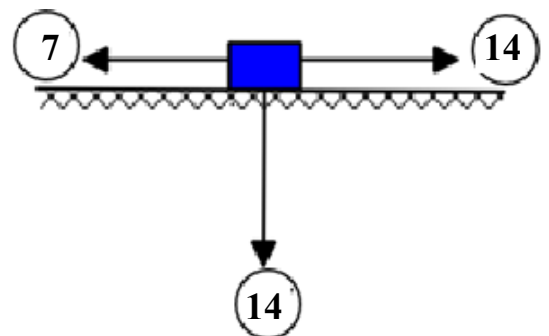
(Where the forces are measured in Newtons)



10) In the opposite figure:

If the body is about to move
under the action of the forces
shown in the figure on a rough
horizontal plane,
find the coefficient of static friction
between the body and the plane.

(Where the forces are measured in Newtons)





- 11) A body of weight 60 Newtons was placed on a rough inclined plane inclined to the horizontal at an angle whose $\sin = \frac{3}{5}$. It was observed that the body is about to move under the action of its weight only. Find the coefficient of static friction between the body and the plane.
- 12) A body was placed on a rough inclined plane inclined to the horizontal at an angle of measure 60° . The coefficient of static friction between the body and the plane was $\frac{\sqrt{3}}{2}$. Explain and state the reason why the body cannot remain in equilibrium on the plane.
- 13) A body of weight 400 Newton was placed on a rough inclined plane inclined to the horizontal at an angle of measure 30° . A force was applied to the body in the direction of the line of the greatest slope of the plane upward, so the body was about to move up the plane. If the coefficient of static friction between the body and the plane was $\frac{1}{\sqrt{3}}$. Find the magnitude of the force.
- 14) A body of weight 30 Newton was placed on a rough inclined plane inclined to the horizontal at an angle of measure 60° . A force of magnitude 10 Newtons was applied to it in the direction of the line of the greatest slope of the plane upward, so the body was about to move downward. Find the magnitude of the force if it is known that the coefficient of static friction between the body and the plane is $\frac{\sqrt{3}}{3}$.
- 15) A body of 30 Newtons weight was placed on a rough inclined plane inclined to the horizontal at an angle of measure θ° . A force of magnitude $20\sqrt{3}$ Newton. It was applied to it in the direction of the line of the greatest slope of the plane upward, so the body was about to move upwards. Find the measure of the angle θ if it is known that the coefficient of static friction between the body and the plane is $\frac{\sqrt{3}}{3}$.

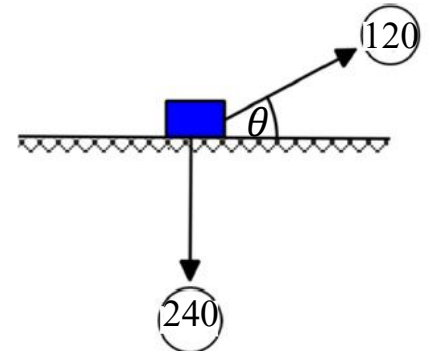


8 الأداء المنزلى - الصف الثانى الثانوى - علمى - تطبيقات الرياضيات لغات - الأسبوع الثامن

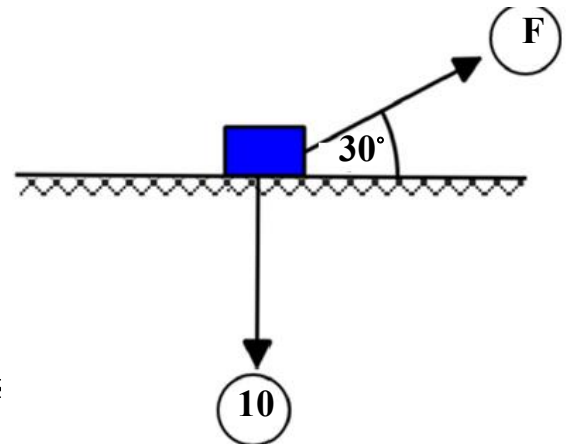
- (1) A body of weight 15 kg.wt is placed on a rough horizontal plane. A horizontal force of magnitude F kg.wt is acts upon it, making it about to move. If the measure of the angle between the resultant reaction and the limiting friction force is θ , where $\cos \theta = \frac{3}{7}$. Find the magnitude of the resultant reaction.
- (2) A body of weight 36 kg.wt is placed on a rough horizontal plane. A horizontal force acts on it, making it about to move. If the magnitude of resultant reaction is 39 kg.wt , find the coefficient of static friction between the body and the plane.
- (3) A horizontal force of magnitude 60 kg.wt is applied to a container of weight 50 kg,wt containing 12 boxes, each box of weight 25 kg,wt on a rough horizontal ground. The coefficient of static friction between it and the container is $\frac{3}{5}$, find the number of boxes that must be removed so that the container is about to move on the ground.
- (4) A body of weight 32 kg.wt was placed on a rough horizontal plane. Two horizontal forces of magnitudes 8 , 8 kg.wt were acting on the body in the same plane, enclosing an angle of measure 120° between them. The body was about to move. Find the value of the coefficient of static friction between the body and the plane.
- (5) A body of weight 200 kg.wt was placed on a rough horizontal plane. two perpendicular horizontal forces of magnitudes 36, 64 kg.wt were acting on the body in the same plane. The body was about to move. Find the value of the coefficient of static friction between the body and the plane.

- (6) A body of weight W kg.wt was placed on a rough horizontal plane. The coefficient of static friction between it and the body $= \frac{1}{3}$, affected by two horizontal forces of magnitudes 3, 5 kg.wt and the measure of the angle between them is 60° . The body was about to move. Find the value of W .

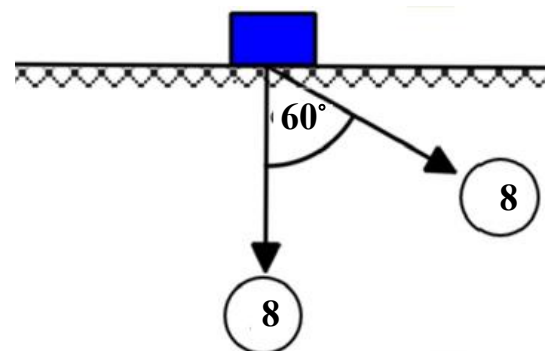
- (7) In the opposite figure:
If the coefficient of static friction between the body and the rough plane is $\frac{\sqrt{3}}{3}$, find the value of θ . if the body is about to move. (Where the forces are measured in Newtons)



- (8) In the opposite figure:
If the coefficient of static friction between the body and the plane $\frac{2\sqrt{3}}{3}$ and the body is about to move, find the value of: F . (Where the forces are measured in Newtons)



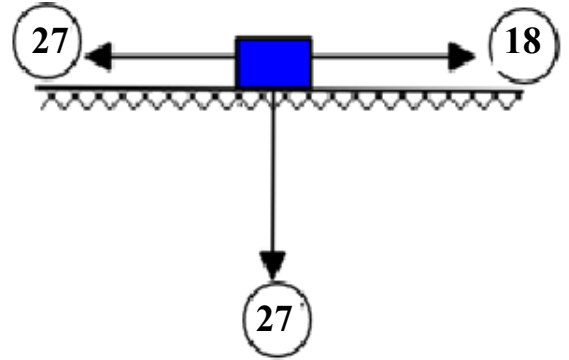
- (9) In the opposite figure:
If the body is balanced under the action of the forces shown in the figure on a rough horizontal plane, find the coefficient of static friction between the body and the plane. (Where the forces are measured in Newtons)



(10) In the opposite figure:

If the body is about to move under the action of the forces shown in the figure on a rough horizontal plane, find the coefficient of static friction between the body and the plane.

(Since the forces are measured in Newtons)



(11) A body of weight 90 Newton was placed on a rough inclined plane inclined to the horizontal at an angle whose $\sin = \frac{5}{13}$. It was observed that the body is about to move under the action of its weight only.

Find the coefficient of static friction between the body and the plane.

(12) A body was placed on a rough inclined plane inclined to the horizontal at an angle of measure 30° . The coefficient of static friction between the body and the plane was $\frac{\sqrt{3}}{6}$. Explain and state the reason why the body cannot remain in equilibrium on the plane.

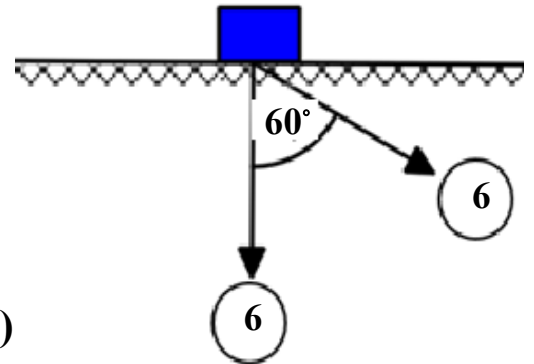


- (13) A body of weight 200 Newton was placed on a rough inclined plane inclined to the horizontal at an angle of measure 30° . A force was applied to the body in the direction of the line of the greatest slope of the plane upward, so the body was about to move up the plane. If the coefficient of static friction between the body and the plane was $\frac{1}{\sqrt{3}}$.
Find the magnitude of the force.
- (14) A body of weight 10 Newtons was placed on a rough inclined plane inclined to the horizontal at an angle of measure 30° . A force of magnitude 10 Newtons was applied to it in the direction of the line of the greatest slope of the plane upward, so the body was about to move downward. Find the magnitude of the force if it is known that the coefficient of static friction between the body and the plane is $\frac{\sqrt{3}}{15}$.
- (15) A body of 10 Newtons weight was placed on a rough inclined plane inclined to the horizontal at an angle of measure θ° . A force of magnitude 6 Newtons. It was applied to it in the direction of the line of the greatest slope of the plane upward, so the body was about to move upwards. Find the measure of the angle θ if it is known that the coefficient of static friction between the body and the plane is $\frac{\sqrt{3}}{15}$.

8 التقييمات الأسبوعية - الصف الثانى الثانوى - علمى - تطبيقات الرياضيات لغات - الأسبوع الثامن

The First Group

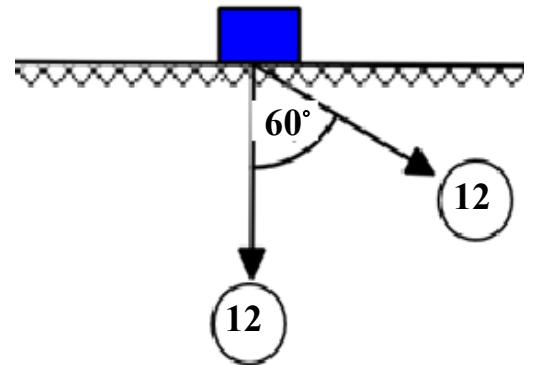
- (1) A body of weight 16 kg.wt is placed on a rough horizontal plane. A horizontal force of magnitude F kg.wt affected it, making it about to move. If the measure of the angle between the resultant reaction and the limiting friction force is θ° , where $\cos \theta = \frac{4}{5}$, find the magnitude of the resultant reaction.
- (2) A body of weight 12 kg.wt. is placed on a rough horizontal plane. A horizontal force acted on it, making it about to move. If the resultant reaction is 15 kg .wt , find the coefficient of static friction between the body and the plane.
- (3) A body weight 40 kg.wt is placed on a rough horizontal plane. Two perpendicular horizontal forces of magnitude 6, 8 kg. wt affected the body in the same plane, making the body about to move. Find the coefficient of static friction between the body and the plane.
- (4) In the opposite figure:
If the body is in equilibrium under the influence of the forces shown in the figure on a rough horizontal plane, find the coefficient of static friction between the body and the plane.
(Where forces are measured in Newtons)



- (5) A body of weight 250 Newtons was placed on a rough inclined plane inclined to the horizontal at an angle of measure 30° . A force was applied to the body in the direction of the line of the greatest slope upward of the plane, so the body was about to move upwards to the plane. If the coefficient of static friction between the body and the plane is $\frac{1}{\sqrt{3}}$, find the magnitude of the force.

The Second Group

- (1) A body of weight 18 kg.wt is placed on a rough horizontal plane. A horizontal force of magnitude F kg.wt affected it, making it about to move. If the measure of the angle between the resultant reaction and the limiting friction force is θ° , where $\cos \theta = \frac{3}{5}$, find the magnitude of the resultant reaction.
- (2) A body of weight 32 kg .wt is placed on a rough horizontal plane. A horizontal force acted on it, making it about to move. If the resultant reaction is 40 kg .wt , find the coefficient of static friction between the body and the plane.
- (3) A body weight 39 kg.wt is placed on a rough horizontal plane. Two perpendicular horizontal forces of magnitude 5, 12 kg. wt act on the body in the same plane, making the body about to move. Find the coefficient of static friction between the body and the plane.
- (4) In the opposite figure:
If the body is in equilibrium under the influence of the forces shown in the figure on a rough horizontal plane, find the coefficient of static friction between the body and the plane.
(Where forces are measured in Newtons)

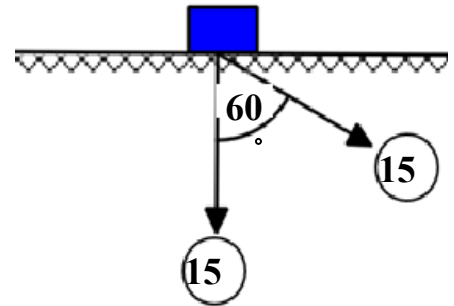


- (5) A body of weight 120 Newtons was placed on a rough inclined plane inclined to the horizontal at an angle of measure 30° . A force was applied to the body in the direction of the line of the greatest slope upward of the plane, so the body was about to move upwards to the plane. If the coefficient of static friction between the body and the plane is $\frac{1}{\sqrt{3}}$, find the magnitude of the force.

The Third Group

- (1) A body of weight 32 kg.wt is placed on a rough horizontal plane. A horizontal force of magnitude F kg.wt acts on it, making it about to move. If the measure of the angle between the resultant reaction and the limiting friction force is θ° , where $\cos \theta = \frac{4}{5}$, find the magnitude of the resultant reaction.
- (2) A body of weight 48 kg .wt is placed on a rough horizontal plane . A horizontal force acted on it, making it about to move. If the magnitude of the resultant reaction is 52 kg .wt , find the coefficient of static friction between the body and the plane.
- (3) A body weight 60 kg.wt is placed on a rough horizontal plane. Two perpendicular horizontal forces of magnitudes 9 , 12 kg .wt affected the body in the same plane, making the body about to move. Find the value of the coefficient of static friction between the body and the plane.

- (4) In the opposite figure:
If the body is in equilibrium under the influence of the forces shown in the figure on a rough horizontal plane, find the coefficient of static friction between the body and the plane.
(Where forces are measured in Newtons)



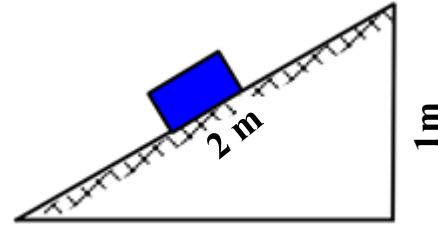
- (5) A body of weight 90 Newtons was placed on a rough inclined plane inclined to the horizontal at an angle of measure 30° . A force was applied to the body in the direction of the line of the greatest slope upward of the plane, so the body was about to move upwards to the plane. If the coefficient of static friction between the body and the plane is $\frac{1}{\sqrt{3}}$, find the magnitude of the force.

٩ الأداء الصفي - الصف الثاني الثانوى - علمى - تطبيقات الرياضيات لغات - الأسبوع التاسع . ٩

- (1) A body of weight 24 Newton was placed on a rough inclined plane and was about to slide. If the limiting friction force is 12 Newton, Find the measure of the angle of inclination of the plane to the horizontal.

- (2) In the opposite figure:

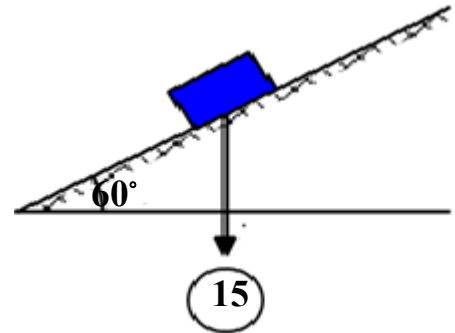
If the body is about to move under the action of its weight only. Find the coefficient of static friction between the body and the plane.



- (3) In the opposite figure:

If the body is about to slide under the action of its weight only. Find the magnitude of the limiting static friction force.

(where forces are measured in Newton)



- (4) A body of weight 35 Newton was placed on a rough inclined plane inclined to the horizontal at an angle whose cosine is equal to $\frac{4}{5}$, if the least force acting in the direction of the line of the greatest slope of the plane upward to preserve the equilibrium of the body is 12 Newton, find the measure of the angle of static friction between the body and the plane.
- (5) A body of weight 169 Newton is placed on a rough inclined plane inclined to the horizontal at an angle whose cosine is equal to $\frac{12}{13}$. If the greatest force acting in the direction of the line of the greatest slope of the plane upward to preserve the body's equilibrium is 120 Newton, find the measure of the angle of static friction between the body and the plane.

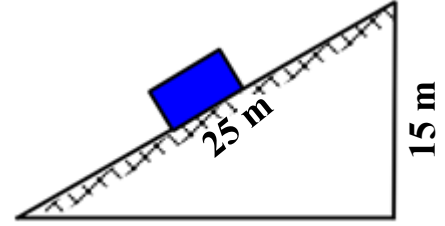


- (6) A body of weight 60 Newton is placed on a rough inclined plane and make an angle whose tangent is equal to $\frac{3}{4}$ with the horizontal. If the measure of the angle of static friction between the body and the plane is θ , where $\tan \theta = \frac{1}{8}$, find the smallest force acting in the direction of the line of greatest slope of the plane and preventing the body from sliding
- (7) A body of weight 45 Newton is placed on a rough inclined plane and makes an angle its tangent $= \frac{3}{4}$ with the horizontal. If the measure of the angle of static friction between the body and the plane is θ , where $\tan \theta = \frac{1}{6}$. Find the greatest force acting in the direction of the line of the greatest slope of the plane and making the body about to move.
- (8) A body of weight 12 Newtons was placed on a rough inclined plane and the body was about to slide, if the limiting friction force is $6\sqrt{3}$ Newton. Find the measure of the inclination angle of the plane to the horizontal.
- (9) A body of weight 30 Newton was placed on a rough inclined plane. It was observed that the body was about to slide if the plane was inclined to the horizontal at an angle of measure 30° . If the angle of inclination of the plane was increased to 60° , find the magnitude of the least force that would affect the body parallel to the line of greatest slope of the plane and prevent it from sliding.

(10) In the opposite figure:

If the body is about to slide
downward the plane.

Find the coefficient of static friction
between the body and the plane.



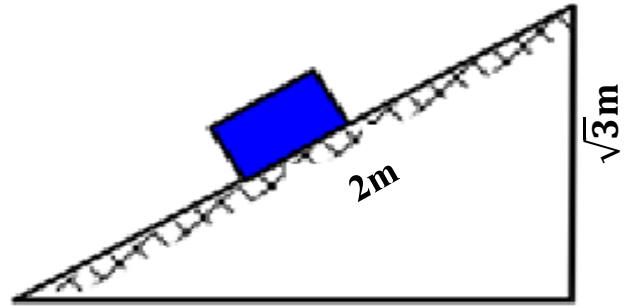
(11) A body of weight 60 kg.wt. is placed on a rough inclined plane inclined to the horizontal at an angle of measure 30° . The body is pulled upwards by a force parallel to the line of greatest slope of the plane which makes the body about to move upwards. If the coefficient of static friction between the body and the plane is equal to $\frac{1}{\sqrt{3}}$, find the magnitude of the pulling force.

(12) A body of weight 150 Newtons is placed on a rough inclined plane inclined to the horizontal at an angle of its measure θ° . If the least and greatest force parallel to the direction of the line of greatest slope of the plane and make the body in equilibrium are 80 and 100 Newton respectively. Find the coefficient of static friction between the body and the plane and the tangent of the angle of inclination of the plane to the horizontal .

(13) A body of weight 65 Newton on a rough inclined plane inclined to the horizontal at an angle of its sine $= \frac{12}{13}$, and a force acting in the direction of the line of greatest slope of the plane upwards affected on the body. If the coefficient of static friction is $= \frac{2}{5}$. Find the two limits between which the magnitude of force that makes the body in a state of equilibrium on the plane is confined.

- (14) A body of weight 4 Newtons was placed on a plane inclined to the horizontal at an angle of measure 30° , and the coefficient of static friction between it and the body $= \frac{\sqrt{3}}{4}$, a force was acting in the direction of the line of the greatest slope upward of the plane of magnitude $\frac{1}{2}$ Newton. If the body is in equilibrium, determine the force of friction and indicate whether the body is about to move or not.

- (15) In the opposite figure:
If the body is about to slide down the plane under the action of its weight only, find the measure of the angle of static friction.

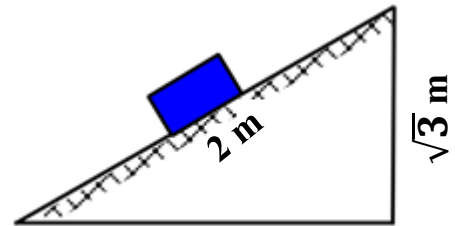


٩ الأداء المنزلي - الصف الثاني الثانوي - علمي - تطبيقات الرياضيات لغات - الأسبوع التاسع

- (1) A body of weight 19 Newton was placed on a rough inclined plane and was about to slide. If the limiting friction force is $8\sqrt{3}$ Newton. Find the measure of the angle of inclination of the plane to the horizontal.

- (2) In the opposite figure:

If the body is about to move under the action of its weight only. Find the coefficient of static friction between the body and the plane.

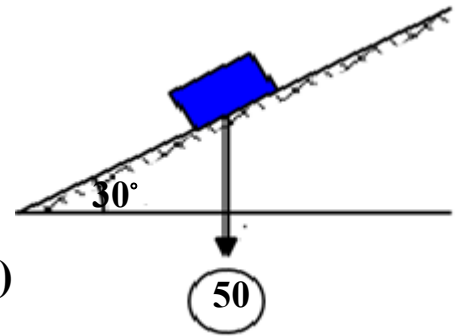


- (3) In the opposite figure:

If the body is about to slide.

Find the magnitude of the limiting static friction force.

(Where the forces are measured in Newtons)



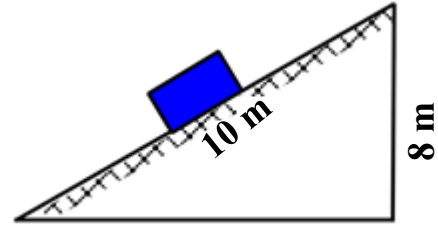
- (4) A body of weight 169 Newton was placed on a rough inclined plane inclined to the horizontal at an angle whose cosine is equal to $\frac{12}{13}$, if the least force acting in the direction of the line of the greatest slope of the plane upward to preserve the equilibrium of the body is 10 Newton, find the measure of the angle of static friction between the body and the plane.
- (5) A body of weight 45 Newton is placed on a rough inclined plane inclined to the horizontal at an angle whose cosine is equal to $\frac{4}{5}$. If the greatest force acting in the direction of the line of the greatest slope of the plane upward to preserve the body's balance is 16 Newton, find the measure of the angle of static friction between the body and the plane.



- (6) A body of weight 45 Newton is placed on a rough inclined plane and make an angle whose tangent is equal to $\frac{3}{4}$ with the horizontal. If the measure of the angle of static friction between the body and the plane is θ , where $\tan \theta = \frac{1}{6}$, find the least force acting in the direction of the line of greatest slope of the plane and preventing the body from sliding.
- (7) A body of weight 60 Newton is placed on a rough inclined plane and makes an angle its tangent = $\frac{3}{4}$ with the horizontal. If the measure of the angle of static friction between the body and the plane is θ , where $\tan \theta = \frac{1}{8}$. Find the greatest force acting in the direction of the line of the greatest slope of the plane and making the body about to move.
- (8) A body of weight 6 Newton was placed on a rough inclined plane and the body was about to slide, if the limiting friction force is $3\sqrt{3}$ Newtons, Find the measure of the inclination angle of the plane to the horizontal.
- (9) A body of weight 30 Newton was placed on a rough inclined plane. It was observed that the body was about to slide if the plane was inclined to the horizontal at an angle of measure 30° . If the angle of inclination of the plane was increased to 60° , find the magnitude of the least force that would affect the body parallel to the line of greatest slope of the plane and prevent it from sliding.

(10) In the opposite figure:

If the body is about to slide downward the plane, find the coefficient of static friction between the body and the plane.



(11) A body of weight 90 kg is placed on a rough inclined plane inclined to the horizontal at an angle of measure 30° . The body is pulled upwards by a force parallel to the line of greatest slope of the plane, which makes the body about to move upwards. If the coefficient of static friction between the body and the plane is equal to $\frac{1}{3\sqrt{3}}$, find the magnitude of the pulling force.

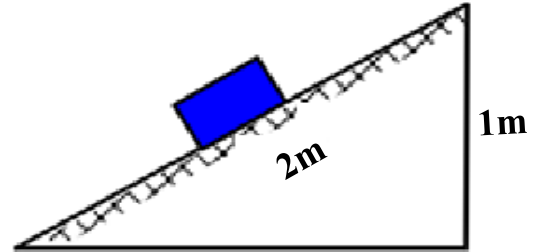
(12) A body of weight 130 Newton is placed on a rough inclined plane inclined to the horizontal at an angle of its measure θ . If the least and greatest force parallel to the direction of the line of greatest slope of the plane and make the body in equilibrium are 100 and 140 Newton, respectively. Find the coefficient of static friction between the body and the plane and the tangent of the angle of inclination of the plane to the horizontal.

(13) A body of weight 50 Newton on a rough inclined plane inclined to the horizontal at an angle of its sine $= \frac{1}{2}$, and a force acting in the direction of the greatest slope of the plane upwards affected on the body. If the coefficient of static friction is $= \frac{\sqrt{3}}{5}$. Find the two limits between which the magnitude of force that makes the body in a state of equilibrium on the plane is confined.

- (14) A body of weight 3 Newton was placed on a plane inclined to the horizontal at an angle of measure 30° , and the coefficient of static friction between it and the body $= \frac{2}{3}$, a force was acting in the direction of the line of the greatest slope upward of the plane of magnitude 2 Newton. If the body is in equilibrium, determine the force of friction and indicate whether the body is about to move or not.

- (15) In the opposite figure:

If the body is about to slide down the plane, under the action of its weight only. Find the measure of the angle of static friction.





٩ التقييمات الأسبوعية - الصف الثانى الثانوى - علمى - تطبيقات الرياضيات لغات - الأسبوع التاسع ٩

First Group

- (1) A body of weight 8 Newton was placed on a rough inclined plane and was about to slide. If the limiting friction force is 4 Newtons, Find the measure of the angle of inclination of the plane to the horizontal.
- (2) A body of weight 40 Newton was placed on a rough inclined plane inclined to the horizontal at an angle whose cosine is equal to $\frac{4}{5}$. If the least force acting in the direction of the line of the greatest slope of the plane upward to preserve the balance of the body is 15 Newtons, find the measure of the angle of static friction between the body and the plane.
- (3) A body of weight 130 Newton is placed on a rough inclined plane inclined to the horizontal at an angle whose cosine is equal to $\frac{12}{13}$. If the greatest force acting in the direction of the line of the greatest slope of the plane upward to preserve the body's balance is 70 Newton, find the measure of the angle of static friction between the body and the plane.
- (4) A body of weight 100 Newtons is placed on a rough inclined plane inclined to the horizontal at an angle of its measure θ . If the least and greatest force parallel to the direction of the line of greatest slope of the plane and make the body in equilibrium are 60 and 680 Newton respectively. Find the coefficient of static friction between the body and the plane and the tangent of the angle of inclination of the plane to the horizontal.
- (5) A body of weight 140 Newton on a rough inclined plane inclined to the horizontal at an angle of its sine $= \frac{3}{5}$, and a force acting in the direction of the line of greatest slope of the plane upwards affected on the body. If the coefficient of static friction is $= \frac{1}{5}$, Find the two limits between which the magnitude of force that makes the body in a state of equilibrium on the plane is confined.

Second Group

- (1) A body of weight 20 Newton was placed on a rough inclined plane and was about to slide. If the limiting friction force is $10\sqrt{3}$ Newton, Find the measure of the angle of inclination of the plane to the horizontal
- (2) A body of weight 52 Newton was placed on a rough inclined plane inclined to the horizontal at an angle whose cosine is equal to $\frac{5}{13}$, If the least force acting in the direction of the line of the greatest slope of the plane upward to preserve the equilibrium of the body is 30 Newton, find the measure of the angle of static friction between the body and the plane.
- (3) A body of weight 70 Newton is placed on a rough inclined plane inclined to the horizontal at an angle whose cosine is equal to $\frac{4}{5}$. If the greatest force acting in the direction of the line of the greatest slope of the plane upward to preserve the body's balance is 70 Newton, find the measure of the angle of static friction between the body and the plane.
- (4) A body of weight 169 Newton is placed on a rough inclined plane inclined to the horizontal at an angle of its measure θ . If the least and greatest force parallel to the direction of the line of greatest slope of the plane and make the body in equilibrium are 52 and 78 Newton respectively. Find the coefficient of static friction between the body and the plane and the tangent of the angle of inclination of the plane to the horizontal.
- (5) A body of weight 80 Newton on a rough inclined plane inclined to the horizontal at an angle of its sine $= \frac{4}{5}$, and a force acting in the direction of the line of greatest slope of the plane upwards affected on the body.
If the coefficient of static friction is $= \frac{3}{5}$, find the two limits between which the magnitude of force that makes the body in a state of equilibrium on the plane is confined.



Third Group

- (1) A body of weight 40 Newton was placed on a rough inclined plane and was about to slide. If the limiting friction force is 20 Newton, find the measure of the angle of inclination of the plane to the horizontal.
- (2) A body of weight 40 Newtons was placed on a rough inclined plane inclined to the horizontal at an angle whose cosine is equal to $\frac{4}{5}$. If the least force acting in the direction of the line of the greatest slope of the plane upward to preserve the balance of the body is 15 Newton, find the measure of the angle of static friction between the body and the plane.
- (3) A body of weight 91 Newtons is placed on a rough inclined plane inclined to the horizontal at an angle whose cosine is equal to $\frac{5}{13}$. If the greatest force acting in the direction of the line of the greatest slope of the plane upward to preserve the body's balance is 140 Newtons, find the measure of the angle of static friction between the body and the plane.
- (4) A body of weight 140 Newton is placed on a rough inclined plane inclined to the horizontal at an angle of its measure θ . If the least and greatest force parallel to the direction of the line of greatest slope of the plane and make the body in equilibrium are 78 and 90 Newton respectively. Find the coefficient of static friction between the body and the plane and the tangent of the angle of inclination of the plane to the horizontal.
- (5) A body of weight 169 Newton on a rough inclined plane inclined to the horizontal at an angle of its sine $= \frac{5}{13}$, and a force acting in the direction of the line of greatest slope of the plane upwards affected on the body. If the coefficient of static friction is $= \frac{1}{4}$, Find the two limits between which the magnitude of force that makes the body in a state of equilibrium on the plane is confined.

كيفية طباعة صفحات معينة من ملف معين مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9

